HALF A CENTURY OF ROPE MAKING

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A. LESCHEN & SONS
ROPE COMPANY.


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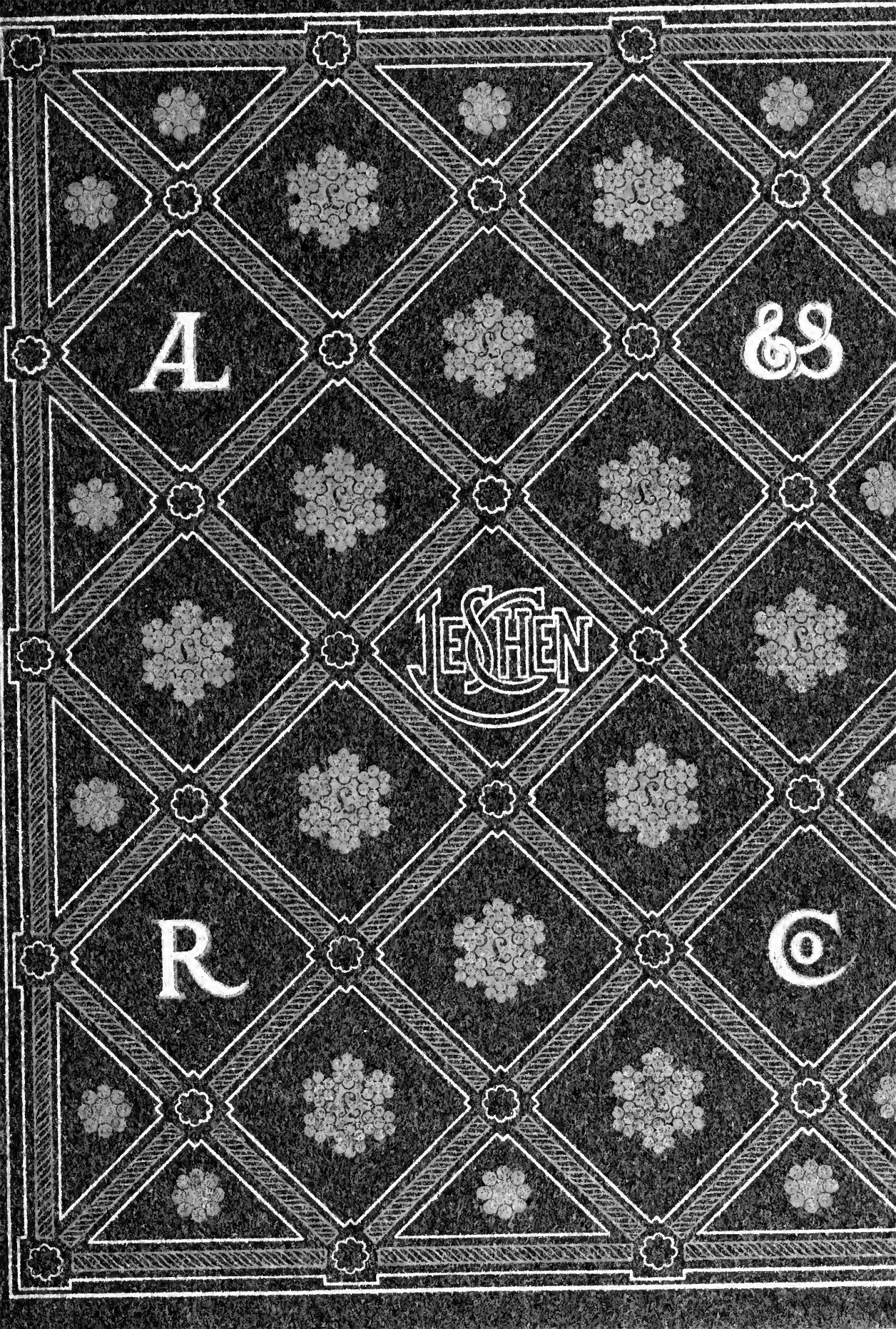
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HALF A CENTURY OF ROPE MAKING

A. Leschen & Sons Rope Company

Office and Warehouse

920 TO 932 NORTH FIRST STREET, ST. LOUIS, MO.

Branch Stores

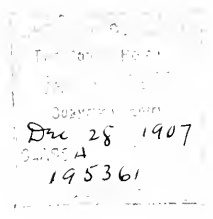
87 to 89 WEST STREET
NEW YORK, N. Y.

137 EAST LAKE STREET
CHICAGO, ILL.

1717 to 1723 ARAPAHOE STREET
DENVER, COL.

313 PACIFIC BLOCK
SEATTLE, WASH.

BEING A BRIEF HISTORY OF THE HOUSE OF A. LESCHEN & SONS ROPE COMPANY, FROM ITS FOUNDING IN 1857 TO THE PRESENT TIME, TO WHICH IS ALSO APPENDED A CATALOGUE WITH ILLUSTRATIONS AND DESCRIPTIONS OF ITS VARIOUS PRODUCTS * *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A. Leschen & Sons Rope Company
St. Louis, Mo.

HISTORICAL

FIFTY years ago, in St. Louis, Adolph Leschen began in a small way to manufacture hemp or fiber rope. To-day the great manufacturing plant of the A. Leschen & Sons Rope Company, at St. Louis, covers thirty-three acres. The four branch houses and twenty-eight agencies handle the product of the works, and Leschen Wire Rope cobwebs the world. It is perhaps not out of place to refer briefly herein to these fifty years of progress and success, and to the policy which has distinguished our methods of manufacture.

In the early days, as now, the Leschen policy was "quality first," and the endeavor has not been to turn out a product larger than that of any other manufacturer, but to make wire rope of a quality which may always be relied upon.

Few changes have taken place in the half century, either in administration or in ideals. The firm name as it appeared fifty years ago was not changed until 1872, when Mr. Henry Leschen, now president of the corporation, became a partner with his father under the firm name of A. Leschen & Son. Five years later, upon the entrance of John A. Leschen, now vice-president, the name was changed to A. Leschen & Sons. Such was the growth of the business, that in 1886 it was deemed wise to incorporate it under the present title of A. Leschen & Sons Rope Company. In 1898 Mr. Charles H. Tucker became secretary and treasurer.

The Leschen Works are located on the Terminal Railway Belt Line which connects with all the trunk lines of the United States. The St. Louis warehouses are on North First Street, and contain a large and varied stock of such types of wire rope as are in constant demand. To effectively handle the business of the Atlantic and Eastern States, the New York store was established at 163 and 165 Washington Street, and is now in the West Street Building, Nos. 87, 88 and 89 West Street. This, in addition to being one of the distributing points of enormous quantities of **Hercules** and PATENT FLATTENED STRAND Rope, is also the headquarters of the fast growing export trade. Through the Chicago branch, at 137 East Lake Street, rope is supplied for the iron, lumber, coal and stone industries of the middle North. The great mining interests of the West are served through the Denver branch, at 1717–1723 Arapahoe Street, where such rope is carried as is required principally in mining operations and for aerial tramways. The Seattle branch handles the important logging and lumber interests of the great Northwest. In addition to these branches, separate

agencies of the A. Leschen & Sons Rope Company are located at Boston, Buffalo, Philadelphia, Pittsburg, Baltimore, Charleston, S. C., Savannah, Jacksonville, Birmingham, New Orleans, Galveston, Memphis, Chattanooga, Knoxville, Nashville, Cincinnati, Columbus, Indianapolis, Portland, St. Paul, Kansas City, Duluth, Salt Lake City, Butte, Mont., Spokane, San Francisco, Los Angeles.

It would be difficult to overestimate the extent to which wire rope is used to-day throughout the world. Leschen rope will be found in use not only throughout the United States and Canada, but in all of the South American republics, Mexico, Cuba, the Philippines, South Africa, Japan, Turkey, Egypt, India and Russia. It is also in use in the important work at the Isthmus of Panama.

Either through the home office, or through any one of the four branches or twenty-eight agencies, customers may obtain rope made especially to meet their requirements, and because of the care and honesty of purpose maintained in its manufacture, it will be found absolutely reliable. The wire of which Leschen rope is made is of the best foreign grade obtainable. It is specially drawn, tempered in oil to absolute perfection, tough and strong; it will not become brittle, and is tested to insure reliability and uniformity. It is a recognized fact that lives depend upon the tensile strength of a single rope; it is for this reason that we are constantly endeavoring to live up to our well known policy of "quality first." With a view of constantly improving our product, we endeavor to keep in touch with users of our rope, for although their opinion usually embodies itself in approval, we obtain from them many valuable suggestions as to practical methods. We wish to express our appreciation both of their commendation and their suggestions.

It is part of our business to study the needs of wire rope users in general and to produce rope not only as nearly perfect as possible, but in the various types which meet the varying conditions with which we are constantly confronted. Success along these lines can only be brought about by a total disregard of that personal gain which sacrifices reliability. It is understood by everybody employed by us that quality, not quantity, is paramount first and always; no encouragement is given to increase of the output, for when volume is the chief consideration quality is apt to be sacrificed. It is because of all these facts that we have been able to maintain the reputation which we have enjoyed during the past half century, and which alone is sufficient to account for the widespread and constant growth of our business.

A Few Words on Wire Rope

IT is almost impossible to enumerate the different uses to which wire rope is adapted, new uses being continually found for it. In most cases it is more economical and more suitable for the work than either hemp rope, chain or iron rods.

In the use of wire rope the most satisfactory results are always obtained with large size sheaves and drums; the greater the diameter of the sheaves and drums the longer the rope will last.

Experience has demonstrated that wear increases with speed; therefore true economy results from increasing the load and diminishing the speed. For a working load, one-fifth of the ultimate strength of the rope is usually considered safe, although this is not recommended for all cases, as very frequently a greater safety factor is required.

Wire rope must not be coiled or uncoiled like a hemp rope. When not on a reel, roll on the ground like a wheel or hoop to prevent kinking or untwisting.

For the transmission of power the sheaves should be lined with leather or rubber, or both, which increases adhesion and prevents wear.

Safety and Economy

To ensure against accidents, the ordinary precautions should be taken to frequently examine wire rope and install a new one before the old is worn to the danger point. No type of rope should be used unsuitable for the work.

We advise the use of rope of high grade steel, viz., our **Hercules,** for the reason that it gives great strength and durability, and in obtaining the strength desired in the rope a smaller diameter rope can be used and thereby the dead weight of the rope itself is reduced. The best results are secured from a rope made of the best obtainable material, as rope made from low grades or cheap material is far more expensive in the end.

Every wire which enters into the manufacture of a Leschen rope is carefully tested as to torsions and tensile strength, and all wires not up to the required standard are rejected. These tests are filed for reference.

Lubrication

A few observations upon the internal and external lubrication of wire rope as a means of reducing the friction of the wires upon each other and preventing corrosion, which has so detrimental an effect upon the nature of various steels. We find that by using graphite, suitably prepared, we have secured a most satisfactory composition, which acts both as a lubricant (by materially reducing the internal friction of the

wires on each other) and also as a preventive against corrosion; and it is so applied to the rope in the course of manufacture that it reaches the inner parts and interstices of the rope and renders the various wires impervious to the deleterious effect of bad water, steam or other damaging matters found in the working of mines, etc. It also insures greater flexibility, which is shown by the following experimental test:

An unlubricated rope stood 16,000 right angle bends before fracture commenced, whereas a sample of the same make of rope when lubricated stood 38,000 bends before showing fracture.

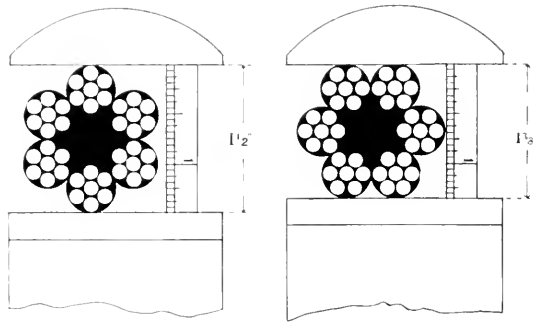
An excellent preservative for wire rope is a compound of our own production which is the result of considerable experience with wire rope lubricants and preservatives. See page 81.

How to Order Wire Rope

If possible, state your requirements by writing to the nearest branch or agency, or to the home office, in order that recommendation may be made covering the use of a rope best suited to your needs. Years of experience and years of study of varying conditions of service make it possible for us to be of use in this connection.

Measurements

The diameter of a wire rope is expressed by a diameter of a circle which will enclose it. Thus, in using a caliper rule, be careful to avoid measuring across two strands side by side; measure rather from the top of any one strand to the top of the opposite strand, which will result in the true diameter. This is most important, as otherwise wheels or sheaves which might be ordered at the same time would be found too small to carry the rope, as the diameter would be inaccurate through false measurement.



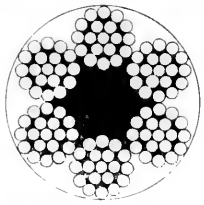
Construction

The many purposes for which wire rope must be constructed, each having its peculiar working conditions, demand a considerable number of different lays of strands and twists of wires of a great variety of size, number and material. Wire ropes are usually made with hemp center, the hemp forming a cushion around which are laid the strands, and which is quite essential to pliability, though ropes with wire center have their uses.

Our description following is confined to a general explanation of our PATENT FLATTENED STRAND construction, the Round Strand, Lang's Lay, and their differences.

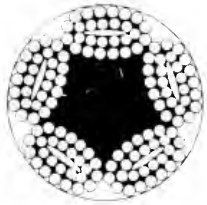
Patent Flattened Strand

PATENT FLATTENED STRAND wire rope has its name from the shape of the strands of its construction in contradistinction to those of the Round Strand type of rope. For reasons quite simple and very practical it is often operated with economy under conditions where no other construction of wire rope can work successfully.



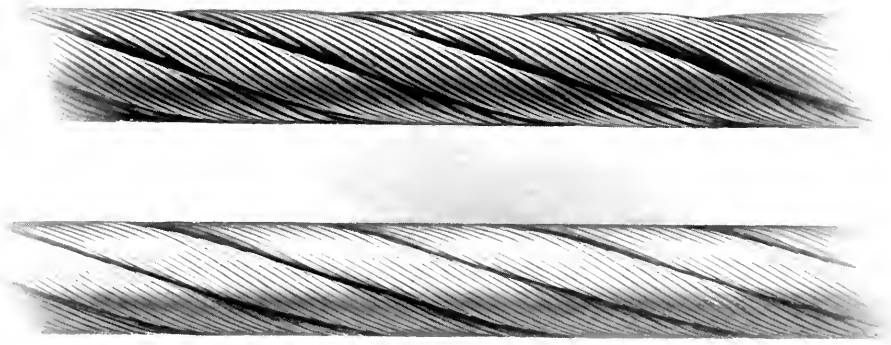
Round Strand

Comparative wearing surface between Round and PATENT FLATTENED STRAND Wire Rope.



Flattened Strand

The greatest advantage obtained in the FLATTENED STRAND wire rope is the wearing or contact surface of each strand, which instead of being one external wire in the periphery is at least six. This means that through the full length of rope the wear comes upon this broader surface composed of several wires. The wear is consequently lessened upon any one individual wire, the tendency to brittleness is minimized, the necessity of the use of heavier wire eliminated, all of which results in extreme flexibility, less liability to crushing, frequent in other types of construction, and, owing to the resulting lighter wear, so large a margin between working load and breaking strain need not be considered. The wearing surface is approximately 150 per cent. greater than that of Round Strand rope.



These are illustrations of Patent Flattened Strand rope. The first is from a photograph of new rope, the second after long continued use

Another quite important feature of this type of rope is that the interstices between the strands being lessened, a greater number of wires are used, resulting in greater strength for the same diameter than that of Round Strand.

A peculiarity of PATENT FLATTENED STRAND rope is that it is quite free from a tendency to spin or kink, and owing to its remarkably smooth wearing surface, saves wear on pulleys, sheaves and drums. It is made from **Hercules** quality of steel, Special steel, crucible cast steel and Swedes iron.

Price lists and data, pages 50 to 55.

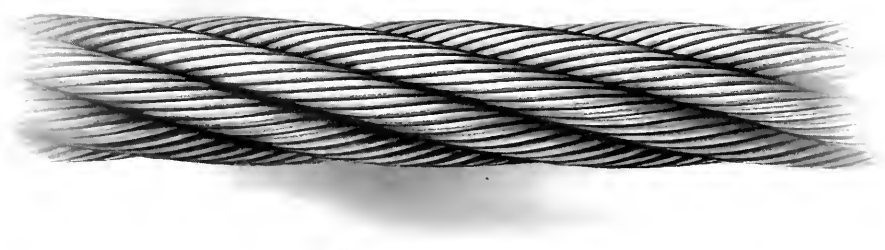
Round Strand

Leschen's Round Strand Wire Rope is composed, like all other round strand rope, of a given number of wires twisted into strands, the wires running reversely of the lay of the strands, which are then laid around a hemp center. This results in a somewhat corrugated wearing surface due to the interstices between the strands. These strands usually consist of 6, which are in turn composed of 7, 9, 12 or 19 wires each, resulting in a finished rope from 42, 54, 72 or 114 wires.

Rope of 6 strands with 19 wires in each strand is the type commonly used in the round strand construction for hoisting purposes. Rope made with 7 wires to the strand is used largely for haulage purposes in mines and on inclines and also for the transmission of power. Seven-wire rope, when made of galvanized wire, is used for guys, ships' rigging, etc. Rope with 12 wires to the strand is sometimes used for haulage purposes and when made in galvanized rope it is used for guys and for ships' rigging.

We make the round strand rope in our **Hercules** quality of steel, also in Special steel, crucible steel and plow steel, Swedes iron and galvanized iron, dependent upon the purpose for which it is intended.

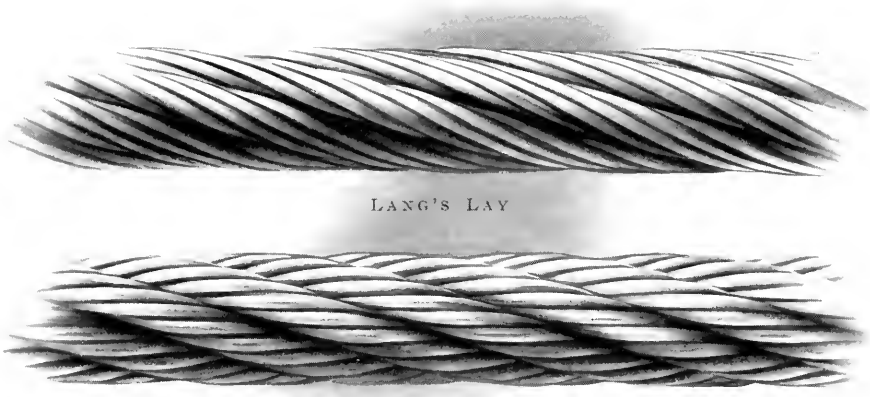
Price lists and data, pages 50 to 68.



ROUND STRAND

Lang's Lay

The term "Lang's Lay" is given to a rope so constructed that the wires of each strand and the strands themselves all lay in the same direction; whereas, in ordinary constructions the wires in the strands are laid in one direction, and the strands composing the rope are laid in the other. This "Lang's Lay" method of construction should be used where rope is liable to be subjected to pressure and crushing force which results in a greater wear in the interior of the rope, due to the wires and strands crossing each other, than if they are laid in this Lang's method of construction.



LANG'S LAY

ORDINARY LAY

Quality—Materials Used

Successful wire rope manufacture must include a sufficiently wide range of qualities of material with the aid of a variety of constructions to be properly adapted to the peculiarities of almost innumerable uses. In classifying them here under general heads it is not with the intent of providing a guide to the wire rope user by which he can select a rope best fitted for his use. This would be a wholly impracticable undertaking, as certain working conditions require a certain grade and construction of wire rope, and it is only from a knowledge of what is required that the proper wire rope can be determined upon. The purpose to always have the right rope in the right place has led us to study conditions, and if unusual, to then design a rope to fit them.

Hercules Wire Rope

Trade mark registered

The drawing of steel wire of sufficiently high tensile strength to successfully withstand extra heavy duty developed in many phases of wire rope usage, often results in failure to secure the indispensable factors of toughness, pliability and elasticity, and herein lies the chief causes of the failure of many ropes. Inability to bend them easily and continually over small sheaves and drums without fracture makes most ropes of high tensile strength expensive under severe usage. Another great fault is brittleness where toughness should have been obtained. It was by a special patented tempering process that the superlative features of HERCULES steel—great strength, toughness, pliability, elasticity and uniformity—were combined to make possible the very successful HERCULES wire rope. For work of an extraordinary nature, for exceptionally heavy loads, or where small sheaves are unavoidable, for conditions where life depends upon the strength of a single rope, we unqualifiedly recommend rope made from that unique grade of patent process steel to which we have given the trade name HERCULES. No matter what its type of construction, which varies, as do its uses, HERCULES rope is the only steel rope uniform in density, texture, elasticity, elongation and strength. It is essentially a safe rope. It is the best that can be bought at any price, and because of its dependability it is the cheapest made for those uses for which we recommend it.

HERCULES wire rope is a trade-marked rope and in order to designate the finished product so that all may recognize it, all HERCULES wire rope, whether flattened strand or round strand, is made with one colored strand. For nearly a quarter of a century no condition of service has developed which has been found too severe for this rope. It is flexible, easily handled, not easily abrased, and more adapted to sudden and great strains than any other wire rope in the world.

Price lists and data, pages 50, 51, 56 and 57.

Special Steel

Trade mark registered

Our Special Steel wire rope, as its name implies, is made from a special grade of steel combining high tensile strength with flexibility and toughness. These, with many other properties, make it suitable for rough and heavy duty.

The satisfactory results obtained from the use of our Special Steel wire rope have warranted us in securing a trade-mark to protect consumers against inferior grades.

Price lists and data, pages 53 and 59.

Crucible Steel

Crucible cast steel wire ropes are standard for ordinary work, being of a moderately high tensile strength and quite flexible. They are used for mine haulage, transmission of power, and for varied uses where there are no unusual conditions to overcome and excessive strains to be encountered.

Price lists and data, pages 54 and 60.

Plow Steel

Plow steel wire rope gets its name from a quality of steel originally used in steam plowing, a class of duty requiring a rope able to drag over sharp stones, stumps and rough ground without abrasion. The tensile strength developed in plow steel wire rope is high and this rope is successfully used where heavy work is performed under conditions where sufficiently large drums and sheaves are practicable.

Price lists and data, page 61.

Swedes Iron

Iron ropes are much more pliable, are softer and of a lower tensile strength than steel. They are used principally on elevators, and sometimes in transmission of power, and also for many other uses where the work is not severe and where a greater pliability than steel rope possesses is necessary. Substituting iron rope for steel, however, is never satisfactory, and the manufacturers should be consulted with regard to the advisability of its employment in other than its well known uses. We make them of the highest grade Swedes iron in both our PATENT FLATTENED STRAND and Round Strand constructions suitable for all iron rope purposes. Our Swedes iron PATENT FLATTENED STRAND rope is an ideal elevator rope giving long life and excellent results.

Price lists and data, pages 55 and 62.

Tiller

Tiller rope, being made of a large number of small fine wires, is the most pliable wire rope manufactured. Its use is restricted to conditions where the strain is light and very small sheaves are necessary. It is chiefly used on elevators as a hand rope and as a steering rope on river steamboats.

Price lists and data, page 63.

Galvanized Rope

For protection against the action of salt air, moisture and like elements, the wires in the ropes are frequently galvanized, as for guys, suspension bridge cables, hawsers and ships' rigging. It is not, however, advisable to use a galvanized rope as running rope, or to pass over drums or sheave wheels, except when power is transmitted by means of our galvanized rope of special construction as shown on page 65.

In addition to the galvanized iron and steel ropes herein listed, we galvanize ropes of any quality or construction of steel whenever required.

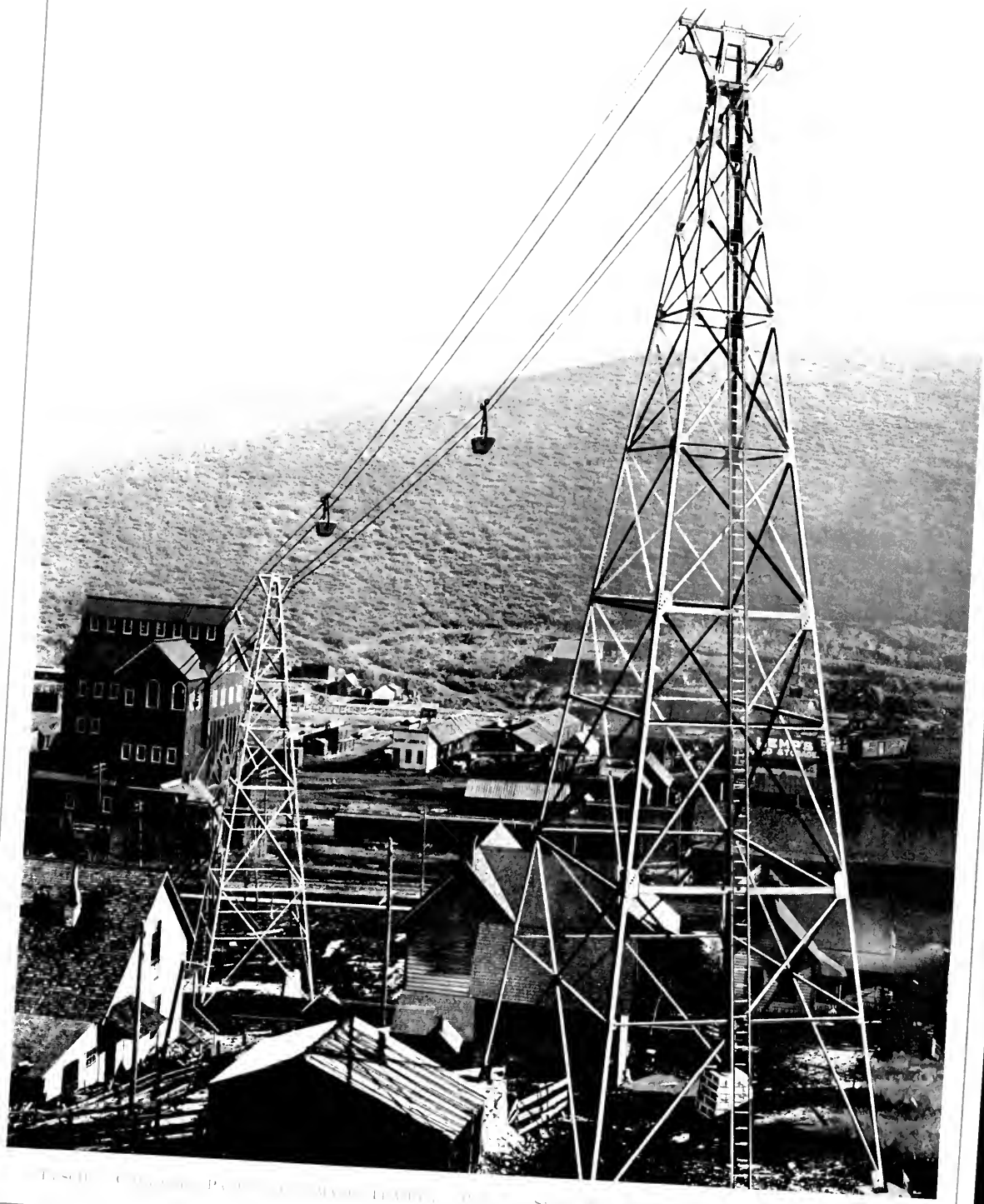
The process of galvanizing which we use insures a coating of zinc equal to every necessity.

Price lists and data, page 64.

Galvanized Strand

For guying of every sort within certain limits the cheapest and most effective support is galvanized strand. Strand is simply seven steel wires twisted together, properly galvanized for proof against rust and corrosion, and is used in enormous quantities by electric light, telephone and street railway companies. It is made in sizes from $\frac{3}{32}$ inch to $\frac{1}{2}$ inch.

Price lists and data, page 63.



Aerial Wire Rope Tramways

THE advantages of transporting material by means of aerial wire rope tramways have been fully demonstrated in the large number of equipments now in operation, and the increasing demand is a manifestation of their usefulness and economy.

The successful operation of many a mine is dependent upon the feasibility and low cost of carrying its ores, all of which can be accomplished by the use of aerial tramways, and thereby justify the development of the mine.

The field of utility of aerial wire rope tramways is however not confined to the transportation of ores alone, but on the contrary, coal, sand, rock, grain, lumber, etc., is just as economically carried. While it is generally understood that aerial wire rope tramways are used in mountainous sections where railroad construction is too costly or impracticable, it must also be understood that they are just as efficient over a level or moderately level country.

The towers which support the tramway are usually located at wide intervals, so that the intervening ground is free for cultivation or other uses. A right of way can thus be more easily secured and most frequently at less cost than that required for railroad construction.

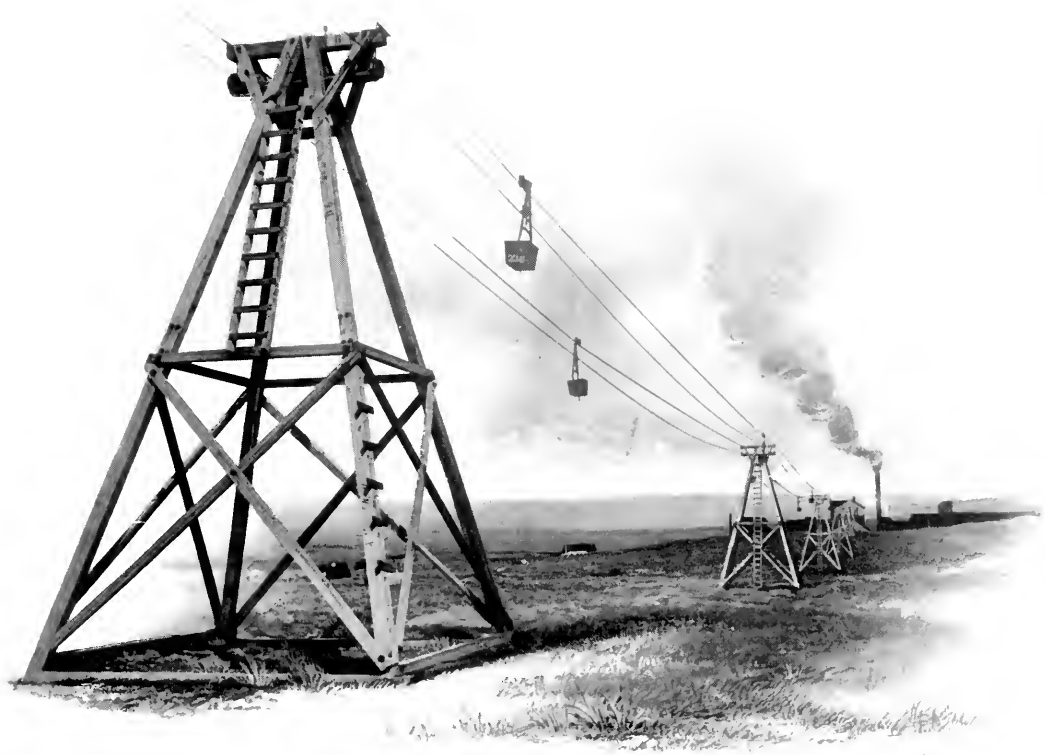
Wire rope tramways can be operated independent of the elements such as rain, sleet or snow.

Realizing the vast field of the utility of aerial wire rope tramways, and the fact that every proposition has specific requirements and conditions to be overcome, we have perfected a number of distinct systems. The result is that we are not limited to one type whether it is adaptable or not, but are prepared to supply one of our various systems best suited for the requirements and conditions. The determination of the most suitable system for a proposition is made only after we are familiar in detail with the requirements and the contour of the ground. All such recommendations are made by our engineers and are based on the results of our long and successful experience in tramway construction.

In the following pages we will treat of the various systems which we build.

To parties who are interested and desire to obtain the best results from their expenditure, we will cheerfully give the addresses of the users of the Leschen Company's systems of tramways.

We are prepared to promptly furnish preliminary estimates on any of the systems which we build, upon receipt of the necessary data. For final estimate an accurate profile of the ground is necessary.



LESCHEN COMPANY'S PATENT AUTOMATIC TRAMWAY, SIXTEEN MILES LONG
Built for the Penn-Wyoming Copper Company, Encampment, Wyoming

Leschen Company's Patent Automatic Aerial Wire Rope Tramway

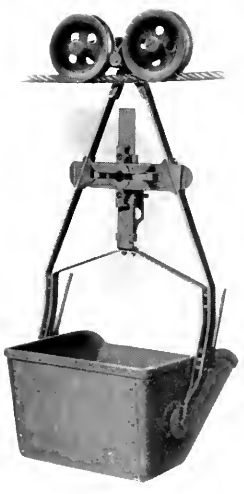
THE Leschen Company's Patent Automatic Wire Rope Tramway is an improved system of the double rope type in which the carriers travel upon stationary track cables and are propelled or controlled by an endless traction rope. The operation is automatic, thereby minimizing the labor required in transporting the material and also insuring a large carrying capacity within a given time. The length to which our automatic systems can be built and economically operated is practically without limit, varying from a few hundred feet to any length as has been demonstrated by our Automatic Tramway, built at Encampment, Wyoming, sixteen miles in length.

It is customary in practice to divide a long tramway into several sections, depending upon various conditions, such as length, capacity, gradients, etc.

The cables or wire ropes used are supported by towers, built usually of wood although frequently steel construction is used. The number, heights, and their spacing

depends principally upon the profile of the ground. It is our practice to place them 250 to 300 feet apart on level stretches, but where conditions demand it they can be placed at intervals of from 2,000 to 3,250 feet, if necessary. The track cables rest on long bearing saddles on the top of the towers, and the traction rope is supported by guide sheaves or rollers placed below the saddles. The sheaves are made from cast steel and are provided with brass bushings and oil cups. The rollers, when used, are of the sectional type having a hard iron wearing ring, which, when worn, may be replaced at nominal cost.

The construction of our cast steel tower sheave is such as to accommodate the shape of the clip used on the traction rope, so that this cable rests in the groove of the sheave whether a bucket is passing over a tower or not. This feature is fully taken advantage of in designing our Automatic Tramways, by the use of sheaves on all towers where cables are liable to be subjected to undue tension, due to the raising of the cable by the bucket, while passing over a tower. On towers where no additional tension is developed, such as over level ground or uniform gradient, rollers are used instead of sheaves.



Section of

The carriers or buckets are attached to the traction rope by means of clips spaced according to the desired tonnage. The clip is of flat construction with a button-shaped end, and is attached to the traction cable by two encircling bands tightened by two wedges. In this way the hold on the rope is positive and it is absolutely impossible for the carriers to slip on the line no matter what the grade or load may be, and the uncertainty of depending on friction or compression is entirely avoided. The clip, however, is easily removable and may therefore be respaced at intervals so as to distribute the wear evenly around the cable.

The type of bucket used on the Leschen Company's Automatic Tramway is usually a bucket of [illegible] cubic feet capacity, although this size is frequently altered to suit requirements. The bucket rests in a strongly braced frame, which is in turn attached to a carriage consisting of a cast steel yoke and two cast steel sheaves for traveling over the track cables. This arrangement allows free movement, permitting the bucket and frame to hang perpendicular irrespective of the grade. All sheaves on the carriage are fitted with brass bushings and malleable iron caps for oiling the journals.

The bucket is held in its normal position in the frame by two malleable iron latches, one on each side. A tripping bar engages these latches at the unloading terminal when the bucket discharges its material. This operation is automatic and takes place while the carriers are moving, although it is possible in this system to

arrange to detach the carriers for unloading, if desired. The buckets return in their discharged position while traveling to the loading terminal, thereby preventing rain or snow from collecting in them. At the loading terminal the bucket is returned to its normal position and again latched, all automatically, by means of a curved or righting bar.

The malleable iron housing to which the bucket clip is engaged is snow-proof and is attached to the bucket frame. The clip is held in the housing by two malleable iron pawls which are controlled by a malleable iron sliding frame. When a carrier

LESCHEN & SONS PATENT AUTOMATIC TRAMWAY
Built for Chicago Portland Cement Company, Oglesby, Illinois

is in transit the clip is locked between the two pawls, but upon reaching a terminal one pawl is moved back, allowing the clip to pass out of the housing, thereby detaching the bucket from the clip. In a similar manner the carriers are attached to the clips, after which the two pawls are locked by the sliding frame to prevent them from opening. The entire operation is automatic, requiring no attention whatsoever. The clip is not held rigidly in the housing, but has sufficient play under all circumstances.

For the transportation of lumber, bales, light merchandise, logs, water and similar material, special carriers are provided.

Tension or anchor stations are used on tramways over one mile in length, at which stations the track ropes are parted, one section being attached to a take-up device, while the other is anchored in the ground. An overhead rail connects both of the sections of cable, so that the travel of the carrier is not interrupted but continues past the tension station. The traction rope is guided by sheaves.

Both terminal stations of the Leschen Company's Patent Automatic System are provided with a sheave wheel usually ten feet in diameter, around which the traction rope passes. In the periphery of the sheave at the driving or controlling terminal is placed a series of cast steel grips for securing the necessary control of the traction rope. The grips engage the rope from the outside and in such a manner as not to injure it in any way.

Brake rings are used when necessary and are bolted to the arms of the terminal wheel, so that applying a brake stops the traction rope and therefore the entire tramway. The brakes are operated by levers so located that a single attendant can control the tramway and can also load the carriers from the chute of the bin, when the loading terminal is also the controlling terminal.

LESCHEN COMPANY'S PATENT SPECIAL AUTOMATIC TRAMWAY
Built for Bingham-New Haven Copper and Gold Mining Company, Bingham, Utah

The wheel on the opposite terminal is mounted on trucks and attached to a tension device so as to provide a uniform tension in the traction cable.

The track ropes, upon entering one of the terminals, are anchored in the ground, while at the opposite terminal they are attached to a tension take-up device for maintaining uniform tension in the cable. Over-head rail connects both standing cables, allowing the carriers to travel over this rail from one track cable to the other.

All carriers are automatically detached at the loading terminal, and by means of a patent lever device, the speed of all incoming carriers after being detached is gradually retarded and finally placed in a position of rest at the loading point. In like manner and by means of a similar device, each carrier receives an acceleration to the speed of travel of the traction rope before it is attached to the clip. The object of retarding and accelerating is to avoid all jars or jerks in attaching or detaching the carriers, and this we have entirely eliminated, with the result that the life of the machinery and cable is considerably increased.

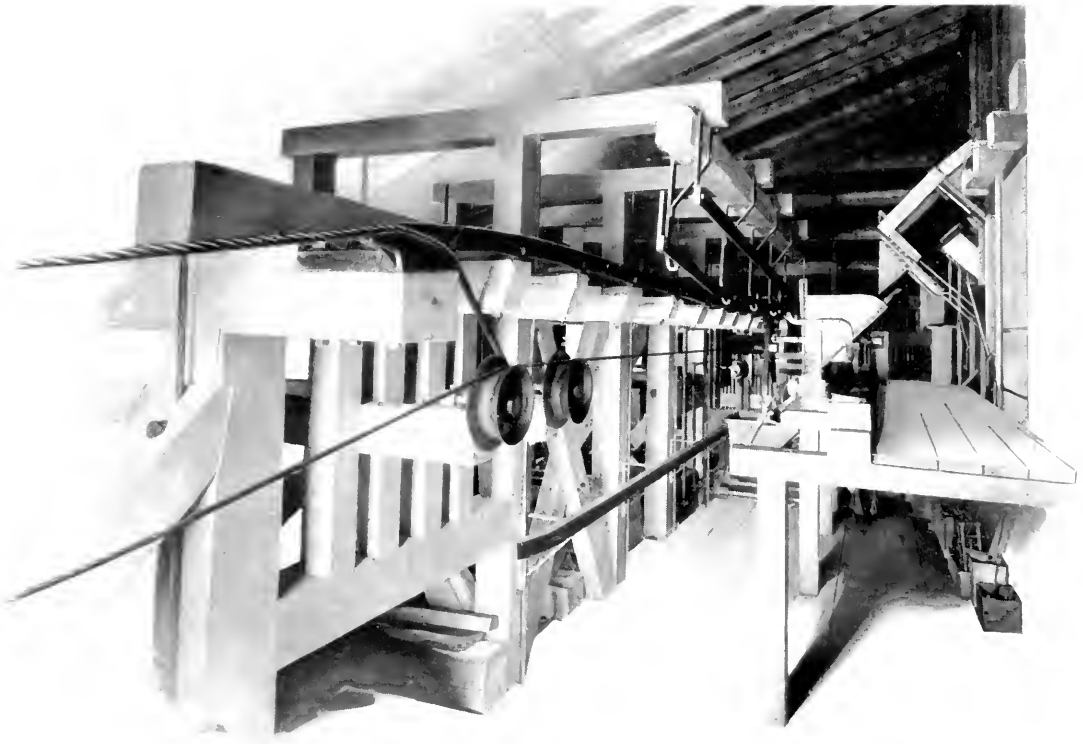
As previously stated, the carriers are automatically discharged at the unloading terminal without detaching them, although this can be done if desired in a similar manner as at the loading terminal. The carriers for return freight and material can be detached for loading if desired.

A decided advantage possessed by our Patent Automatic System is that the carriers, unlike those in all other double rope systems, pass entirely around the terminals over the rail while attached to the traction rope. The necessity of moving them around the terminals by hand in order to clear the sheave wheels is thus avoided. Furthermore, it is not necessary to remove the buckets from the line to load or unload. The amount of labor thus saved, especially where wages are high, is enormous, and the saving will in a very short period pay for the entire equipment.

Whenever desired, intermediate loading or unloading stations can be provided at practically any point along the line.

When the loaded carriers travel down grade and the difference in elevation is sufficient, the tramway will operate by the force due to gravity. If this is not the case, power is applied by means of bevel gearing attached to the terminal shaft and operated by an engine, motor, or other sources of power.

We furnish special scales for automatically indicating the weight of the material transported, and also counters for keeping a record of the number of buckets carried daily.



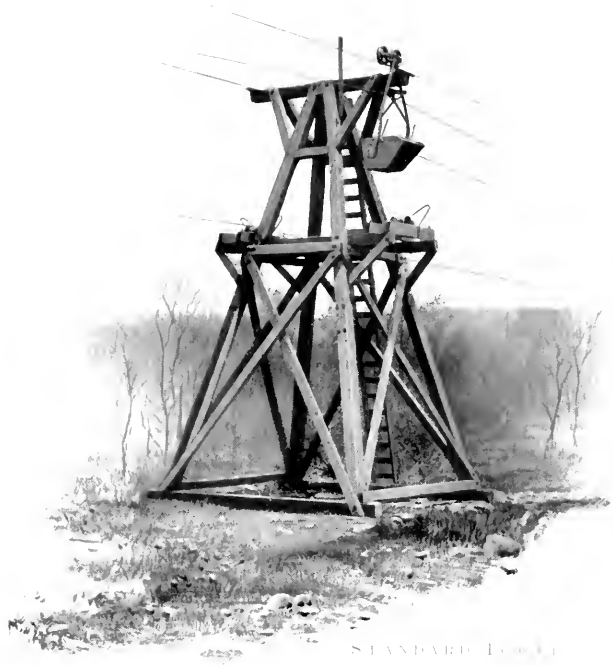
LOADING TERMINAL, LESCHEN COMPANY'S PATENT SAG AUTOMATIC TRAMWAY

Built for Taylor Mountain Mining Company, Gunnison, Colorado

Leschen Company's Patent Special Automatic Aerial Wire Rope Tramway

VERY frequently in an aerial wire rope tramway it is not necessary to detach the carriers at the loading terminal, provided the material to be transported is such that it will flow readily through a chute. When these conditions exist our Patent Special Automatic Wire Rope Tramway can be used to advantage for the economical transportation of the material. The system is similar to our standard automatic type, with the exception that the carriers remain permanently attached to the traction rope and are loaded while moving by means of a traveling mechanical loader.

The clip on the traction rope is positively attached to the carrier frame, which avoids any possibility of the carrier slipping on the steepest gradient. No delicate



adjustment of grips or compression parts is necessary. The mechanical loader is loaded from the ore bin. See illustration on opposite page.

The carrier, upon reaching the loader, starts the latter in motion until it attains the speed of the carrier, when both travel together; in the meantime the gate of the loader raises, discharging the ore into the bucket of the carrier. The loader is then released and returns on an incline rail to the loading position, its return being checked by an air cylinder.

By placing the mechanical loader or the bucket tripping device on movable carriages, the material can be drawn from or discharged into several bins when the latter are located in line with the tramway.

The unloading terminal is the same as that of our Patent Automatic Tramway.

Whenever return freight, such as supplies, is to be carried to the loading point, special carriers are provided, which can be attached or detached at either terminal for loading or unloading.

Whenever angles or curves are encountered in the horizontal plane, our Special Automatic Tramway having an angle rope clip can be used to advantage. The clip is so constructed as to permit the carrier to travel around the curve without interference or attention.

LESCHEN'S PATENT SPECIAL AUTOMATIC TRAMWAY
Built for Hudson Iron Company, Fort Montgomery, New York

Leschen Company's Friction Grip Aerial Wire Rope Tramway

THE Leschen Company's Friction Grip Aerial Wire Rope Tramway is of the double rope type to which the carriers are attached to the traction cable by means of a friction or compression grip. The towers are supported and located similar to those of our Patent Automatic System while the traction cable is supported entirely on guide rollers.

The carriers are generally 6½ cubic feet in capacity, although the size varies with the tonnage and the bulk of the material to be transported. Each carrier is fitted with cast steel sheave wheels which run on the track cables, each wheel being provided with brass bushings and malleable iron oil cups. The friction grip is mounted in a frame on the carrier in such a way that the entire grip is free to revolve and will follow the angle of the traction cable irrespective of its inclination. The construction of the grip provides a powerful toggle arrangement, securing a perfect hold on the traction cable and avoiding slippage. By means of an adjusting device, the wear in the jaws of the grip and cable is taken care of.

Standard Bucket

The bucket proper is suspended in a frame and latched to the latter. When it is desired to dump the bucket the latch is raised, allowing the attendant to revolve the bucket and discharge the material. Special forms of carriers are furnished when timber, logs, grain, water, barrels or merchandise are to be carried.

The construction of both terminals is similar, each consisting of overhead rail around which the buckets travel. The traction rope is passed around a series of sheaves at the controlling end, to which brakes are attached if it is a gravity proposition, and bevel gearing when it is a power proposition. The traction rope passes around a single sheave wheel at the opposite terminal, this sheave being mounted on a tension slide and attached to a weight box for maintaining a uniform tension in the rope. As a carrier enters either terminal it is automatically detached from the cable, and by means of a similar device the buckets are mechanically attached after the operator moves same to the attaching point.

This system is recommended whenever it is necessary to detach the carriers at both terminals in order to collect or discharge material at a number of places, and which is very frequently the case in industrial plants. Whenever the number of loading and discharging points is limited, we would in that event recommend either our Patent Automatic or Special Automatic System, owing to the labor saving features which they possess.

Leschen Company's Single Line Tramway

The Leschen Company's Single Line Tramway consists of an endless wire rope to which buckets are attached. The cable is supported at intervals of 200 feet and upward by means of towers having chilled grooved sheaves over which the cable operates. These sheaves are provided with phosphor bronze bushings, requiring no oil.

The size of the buckets is small compared with the double rope systems, and will average about 2½ cubic feet, although other sizes are sometimes used. The usual construction in our system is to use a revolving type of bucket which is automatically dumped at the discharging point, while at the loading point the ore is automatically loaded into the bucket by means of a mechanical loader. This loader, while traveling with the bucket for a short distance, discharges the material into the latter, when it is released and returns to its initial position.

The style of clip used on the bucket is one which is inserted in the center of the cable in such a way as to make the connection positive, while to the end of the clip is fastened the bucket hanger.

Special carriers can be furnished for the transportation of any class of material, in which case they are designed to accommodate the material to be carried.

The terminal stations are similar, one of them consisting of a grip wheel around which the rope passes, while the other terminal consists of a plain sheave wheel mounted on a tension carriage attached to a weight box for providing a uniform tension in the cable. When it is a gravity proposition, brakes are used in connection with the grip wheel, while if it is a power proposition, a bevel gear is attached to the terminal sheave.

This style of tramway is economical for capacities not exceeding 6 tons per hour, and where the conditions are favorable. A double rope tramway is recommended in preference to single-line equipments in all cases, but frequently it is desired to keep down the initial cost of the equipment, and for cases of this kind a single line tramway can be used to advantage.

Leschen Company's Two-Bucket Tramway

Where the capacity is moderate and the length of line not too great, a two-bucket tramway may often be economically used. This system consists of two parallel cables, upon each of which a carrier operates. The carriers are attached to a traction or pulling rope, the latter passing around a series of sheaves at one end, to which the brakes are attached in a gravity proposition, or driving pulleys when power is required. In most cases it is advisable to use an endless traction rope for this purpose, passing the opposite end around a single sheave wheel, which will produce a more uniform operation and will give better results.

In the operation of this system the loaded carrier travels on one cable, and at the same time the empty carrier returns on the second one. This operation is then reversed.

The buckets or carriers are generally 10 cubic feet in capacity, and are of the automatic discharging type, so arranged that one man is all that is necessary to look after the entire operation.

The cables are supported by intermediate towers which are spaced according to the profile of the ground. An incline is not essential to a line of this type, for when using an endless traction rope the buckets can be operated by means of power whenever necessary.

LESCHEN COMPANY'S TWO-BUCKET TRAMWAY
Built for Victor Fuel Company, Hastings, Col.

Leschen Company's Single Carrier Line

Where the conditions under which a line is installed render power necessary on account of insufficient incline, a single carrier will often give the required service for a limited capacity.

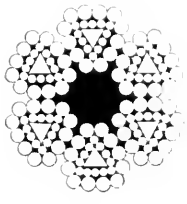
This carrier is operated backward and forward on one track cable by means of an endless rope which is connected to a driving drum or a series of sheaves for obtaining the necessary friction for operating the ropes.

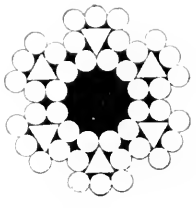
Wire Rope for Tramways

WE invariably recommend our PATENT FLATTENED STRAND wire rope for the track or standing cables, and the traction or running rope on wire rope tramways. The general construction of this rope is such as to expose to wear several wires in each strand instead of only one wire, which is the case in the Round Strand construction. The wear is consequently less on any one wire, thereby increasing the life of the cable. This feature is shown in the views by the large number of wires which come in contact with the circle drawn around the rope.

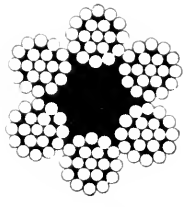
Owing to the large bearing between the strands in this construction of rope, they are less liable to the crushing action which occurs on the tower saddles. The amount of metal in the cross section of the PATENT FLATTENED STRAND wire rope is far greater than in ropes of ordinary construction, making the rope considerably stronger for the same diameter. PATENT FLATTENED STRAND wire ropes will not kink or spin, and after they are in use they will wear as smooth and round as a rod, saving wear on trolley wheels and sheaves. This rope is made in long lengths when necessary, thus doing away with patent couplings and splices, which are very expensive and never as safe as a continuous length of rope.

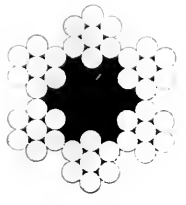
Rope of ordinary or Lang's Lay, Round Strand construction, may be used for the track cable or the traction rope, or for both, if so desired. It, however, will not give the satisfaction and service that the PATENT FLATTENED STRAND wire rope will, and the wear produced on the trolley wheels and sheaves is quite an item, which should be well considered before deciding upon the construction of rope desired.





Cross Sections Patent Flattened Strand Wire Rope





Cross Sections Ordinary Round Strand Wire Rope

Wire Rope Haulage

WIRE rope haulage is an important factor in the different arrangements of mine transportation owing to its adaptability to the various conditions which are met with in mines, and a haulage system must be of low initial cost for installation and with a low cost for its maintenance, and at the same time the material used in its construction must be of the best obtainable and with a workmanship strictly first-class in every particular.

All of this is exactly what we supply in our equipments, and added to this is the fact that from our long experience in the manufacture of wire ropes we are able to produce and supply ropes to suit each individual plant so as to give the very best service under the existing conditions of the mine.

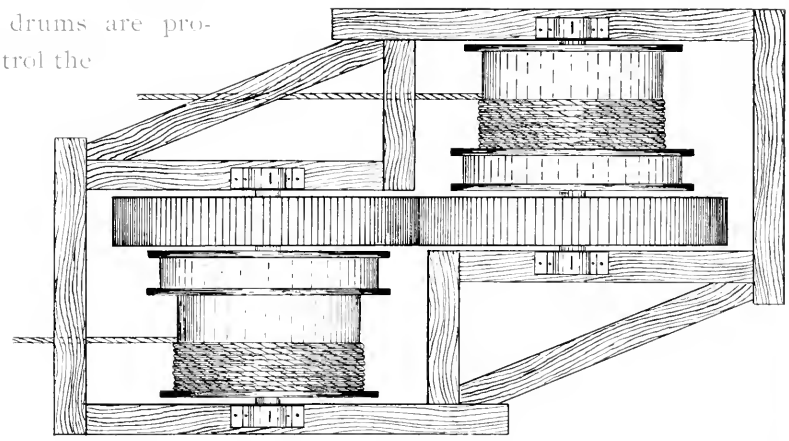
Inclined Planes

Roadways operating by means of wire ropes and having inclinations varying from five to fifty per cent., may be properly termed inclined planes, although there is no fixed limit of the gradients which shall determine the application of this term.

Grades may be variable and the tracks may be curved provided the inclination is sufficient to allow the cars to descend by gravity, and at the same time to draw the rope with them. The two classes of inclined planes are known as "gravity or self-acting planes," and "engine or power planes."

Gravity Planes

Where material is to be transported from a higher to a lower level, gravity planes are the most efficient means that can be employed. Wire ropes attached to drums at the head of the plane and alternately winding and unwinding, permit the loaded cars to be lowered while the empty cars are raised. The head drums are provided with brakes to control the speed of the cars and are of various designs. The general design of these drums is determined by the required duty and the size and styles of ropes. They may be placed under the tracks or in overhead frames.

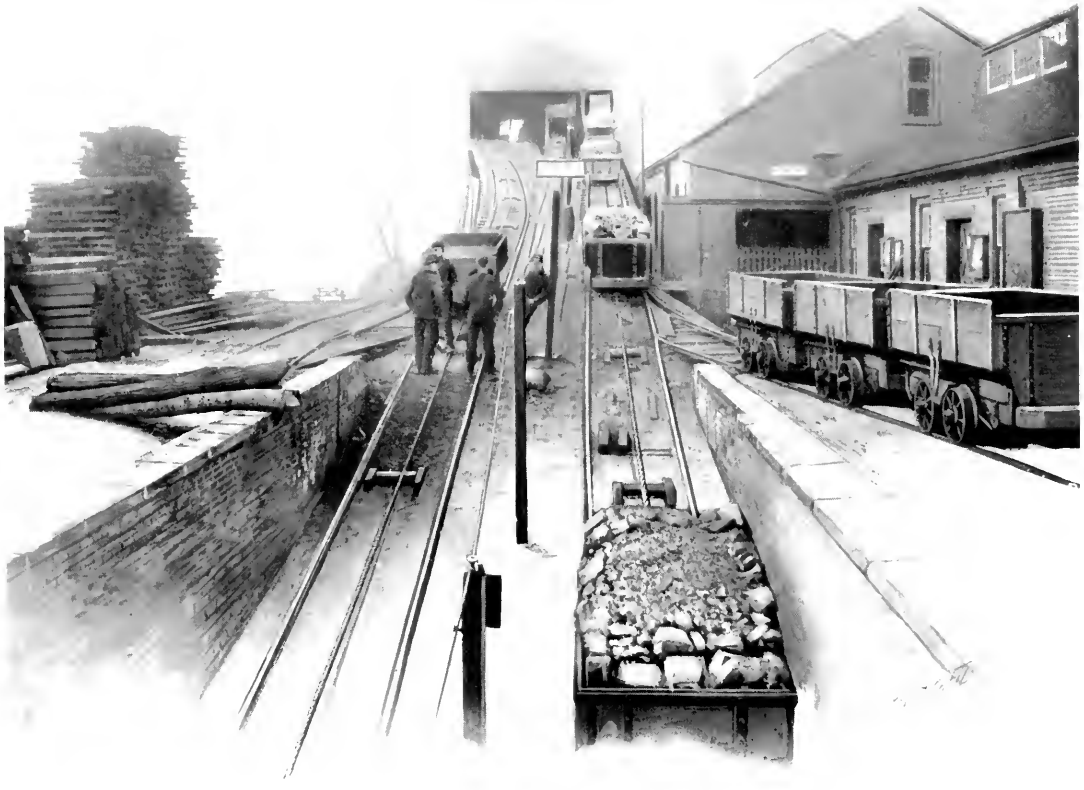


Two comparatively narrow drums, instead of a single wide one, may be keyed to the same shaft. If it is desirable to have both ropes run over or under at the same time, then two drums are mounted on separate shafts which are connected by spur gears.

For light loads a head gear consisting of three sheaves can be used. Two of these sheaves, each provided with brakes and having filled rims, are placed vertically beneath the tracks. The other sheave having a plain turned rim is also placed in a vertical position in front of and tangent to the rope circumference of the two lined sheaves.

For long planes and heavy duty it is best to use two narrow grooved drums mounted tandem and horizontally on a rigid frame, each drum having brakes and brake connections attached to the same frame.

To prevent abrasion of ropes on the ties and to overcome friction, wooden rollers having steel spindles should be placed at frequent intervals along the track, steeper planes requiring fewer rollers than those having easier grades.

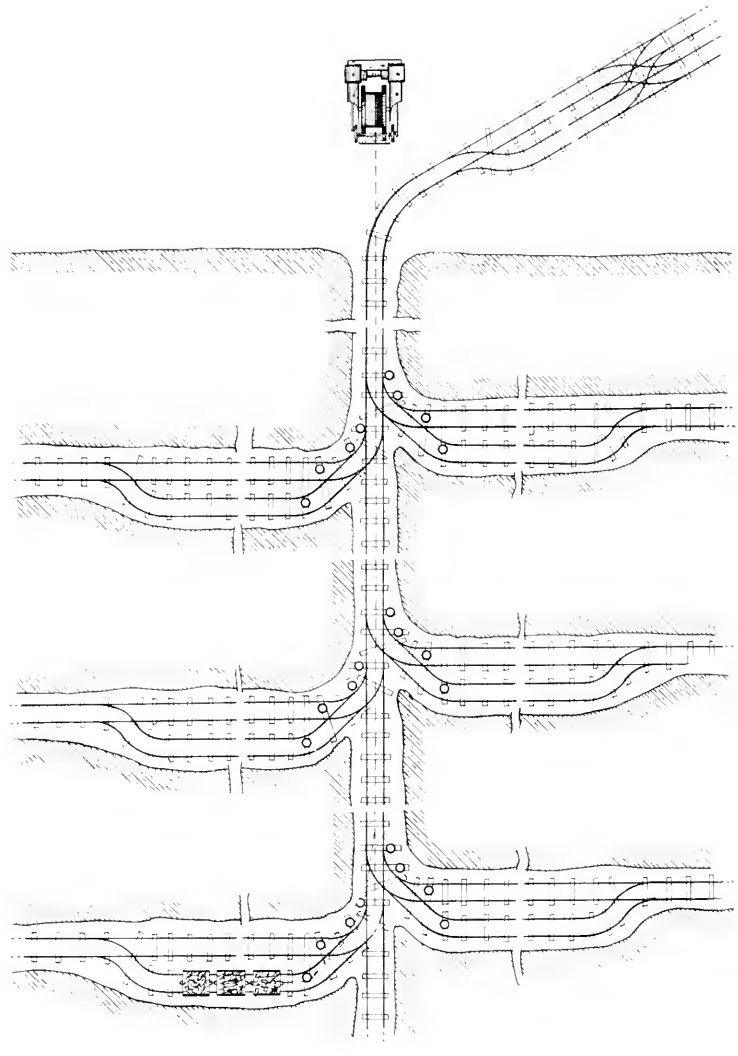


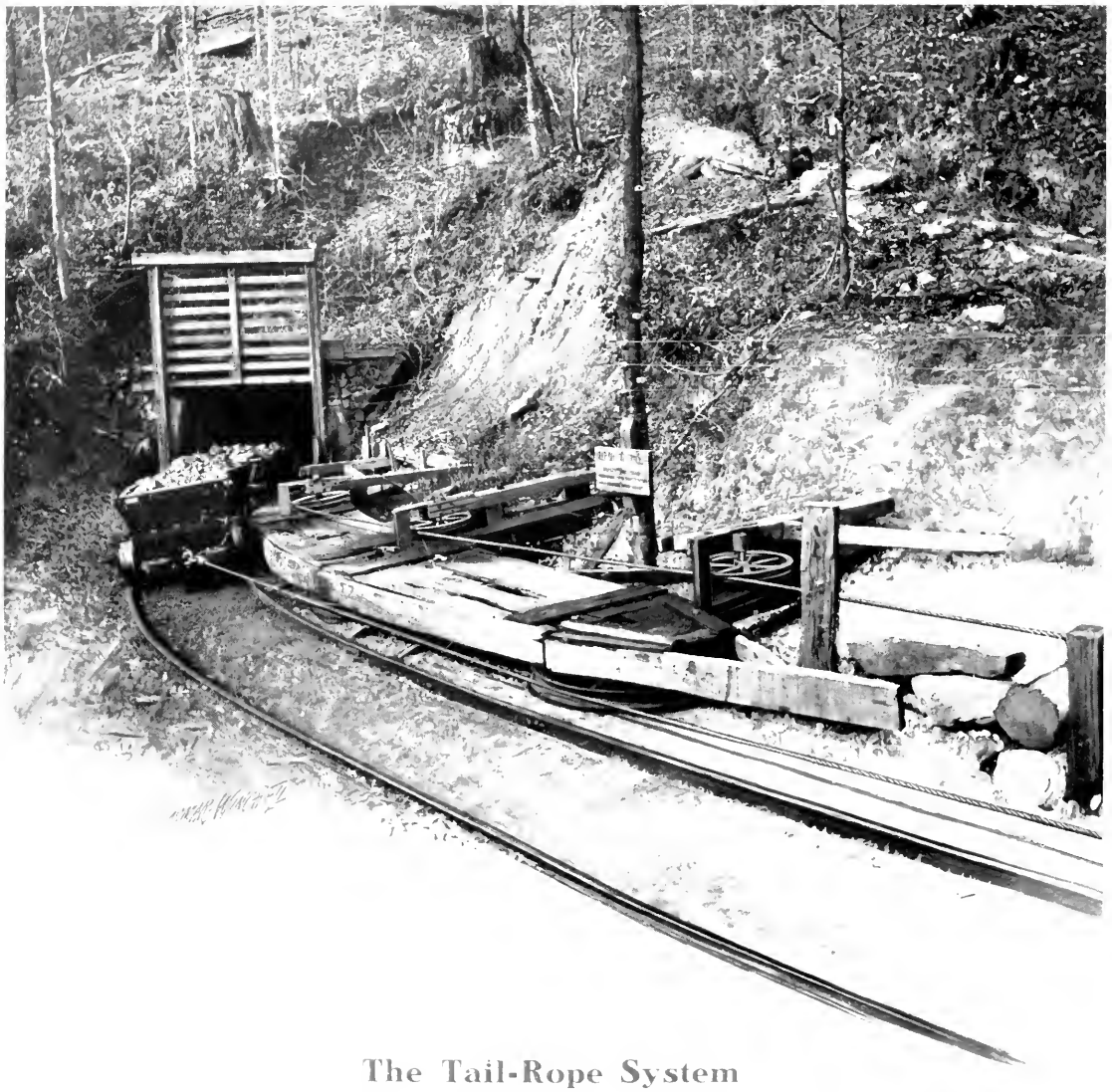
Engine Planes

The single-track engine plane requires a single drum driven by a non-reversing engine and rope of sufficient length to reach from the drums to the foot of the plane. The drum is fitted either with friction or jaw clutch and a powerful brake to control the speed of the descending cars.

The single-track engine plane is particularly applicable in mines where several side entries are located at various levels below the surface. In such cases the descending train may be stopped at each side entry to put empty cars on same, and when ascending the loaded cars can be taken consecutively from the several entries. Where such conditions exist it will generally be found economical to have a side track, located on each side entry near the main slope.

For large tonnage, double-engine planes are preferable; they require two tracks, or else they can be laid with three rails having a turnout at the center and double drum reversible engines and ropes of double the length of the distance from the drums to the foot of the plane.





The Tail-Rope System

No method of wire rope haulage is as widely applied as the tail-rope system, owing to the great variety of conditions under which it may be operated. It will operate successfully regardless of varying grades, number of curves on line, and number of branch lines.

The cost of maintenance is small; its installation requires practically no changes in the roadways where animal power has been employed or where other systems are discarded.

It requires less track and fewer cars than other systems for an equal output, is easily controlled, positive in action and self-contained, and is of especial value where

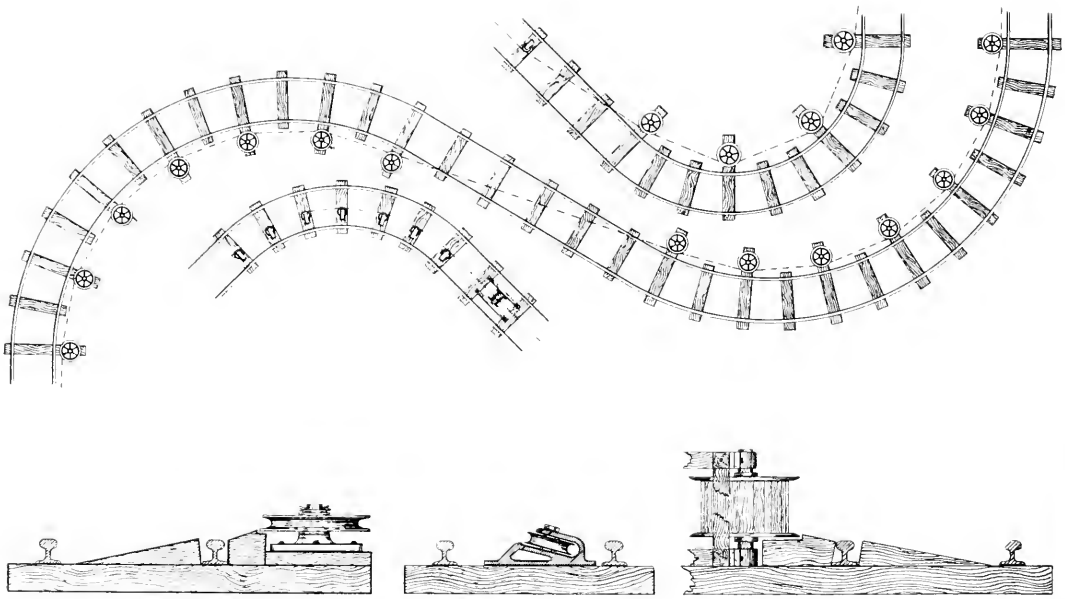
one road only can be utilized for haulage purposes. It may be used on a main road only, and when desirable branch lines may be operated in all parts of the mine.

The principal requirements are a good single track road, a double drum engine and wire ropes of proper length, size and construction, together with the necessary terminal, carrying and curve sheaves and rollers.

In this system the haulage of the loaded cars is effected by the haulage or main rope, which is equal in length to the distance from the drums to the inner terminus of the road. The empty cars are returned into the mine by a separate and frequently lighter rope, which is termed the tail rope and which is twice the length of the main rope.

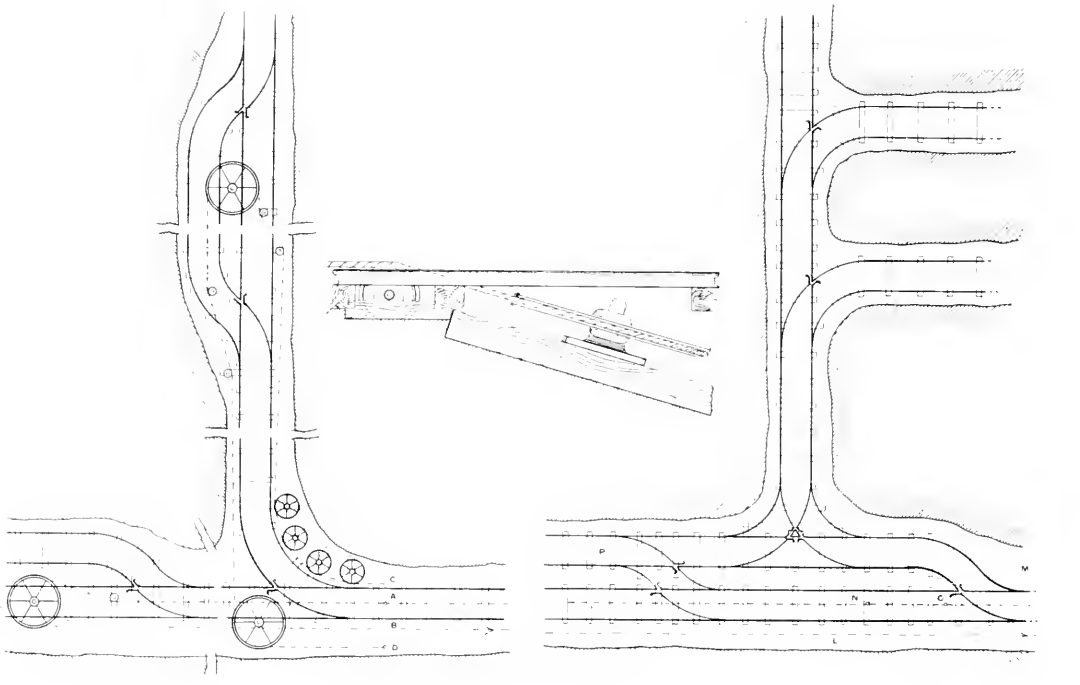
The drums and their engines should be located at some convenient point, preferably near the tipple or other loading point.

The tail rope is led from its drum over carrying sheaves placed along the side or top of the haulage way to the tail sheave, and thence to the center of the track where it is attached to the inner end of the train by suitable couplings, the main rope being attached to forward end of the train in like manner. Both ropes run along center of track alternately and should be supported by wooden rollers placed at frequent intervals. At points where there is considerable strain and wear, iron rollers may be used to better advantage.



Speed of 700 to 1,100 feet per minute is usual on straight tracks, but in going around curves the speed should be reduced to insure safety.

When branch lines are to be operated, each side entry or branch road is provided with a separate rope twice as long as the road, a tail sheave, rollers, wall sheaves and horizontal deflection sheaves. The ends of these side ropes are provided with suitable couplings whereby they may be connected to the ropes on the main line.



In shaft mines the tail-rope system can be applied to bring loads to the foot of the shaft. In such cases the haulage engines may be placed near the foot of the shaft, but whenever practicable they should be placed on the surface.

To properly equip a line on this system it is essential to know the various grades and the curves of the roadways, the total length of the main line and each branch line, the weight and capacity of the cars, and the required output per day.

The Endless-Rope System

In the endless-rope system the driving drum is usually geared to a pair of engines which are supplied with a fly-wheel and governor. The idler drum is also mounted on the same bed plate with the driving drum and engines. In some instances both drums are geared to and driven by the engines.

To prevent undue stresses on ropes and engines developed by unequal wearing of the drum grooves, differential rings are used. These are independent steel rings in each of which a groove is turned and which are loosely confined between the flanges of

the drum. The rope is passed around the drums a number of times without entirely encircling either, the number of half laps being proportional to the amount of frictional adhesion which is necessary to drive the rope without allowing it to slip in the grooves when running with full load.

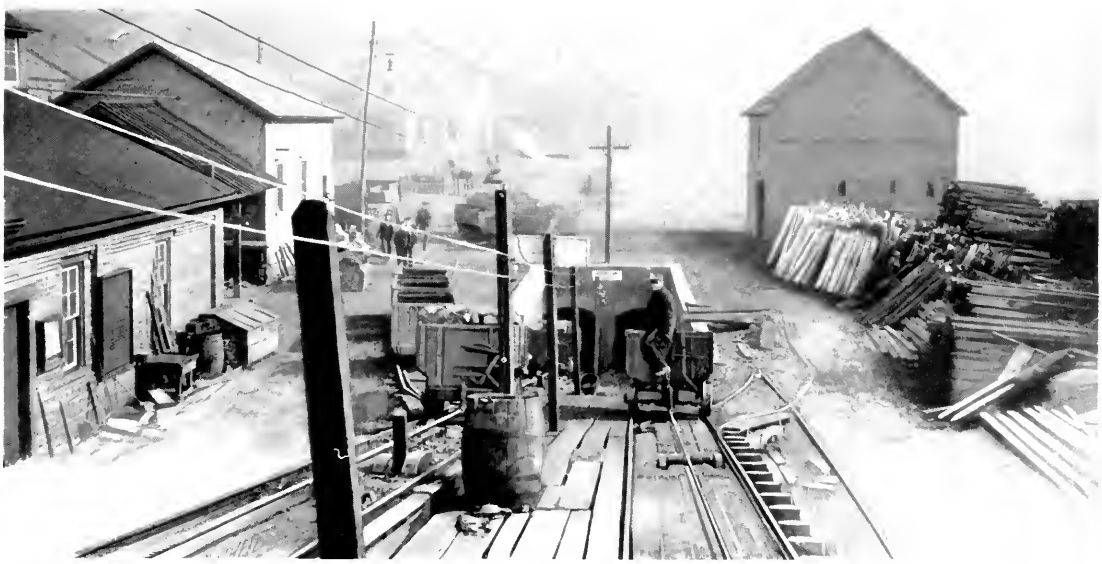
To keep the rope at the proper tension and to overcome elongation, a sheave mounted on a movable truck and having suitable weights attached is employed. The tension should be sufficient to allow the driving to be done with as few laps of the rope on the drums as possible, and at the same time to allow enough slack to permit cars to pass around curves without an undue amount of lateral pressure. The cars are attached to the rope singly or in trains by means of grips or grip cars.

This system to be used most effectively requires a double track, loaded cars coming out over one track and the empties returning over the other.

The system may also be used to handle single trains over single tracks, the trains being attached to the rope by heavy grips, grip cars or link sockets on the rope, but the direction of motion of rope must be reversed each trip; in fact, this method is simply a modification of the tail-rope system.

One of the great advantages of the endless-rope system is that the cars can be run at a moderate speed, and under suitable conditions large outputs can be handled.

The best results may be obtained by applying the system to roads having fairly uniform grades which are all in one direction. This applies especially to instances where the cars cannot be spaced at regular intervals, a condition hard to attain unless the cars are run in trains.



Endless Rope Haulage

Cableways

WIRE rope cableways of different designs for hoisting and conveying a large variety of material are used to great advantage in many situations. In construction work, such as building of dams, locks, sewers, etc., and in coaling of vessels at sea, the cableways are portable or of but temporary erection, whereas, in many manufacturing plants, loading docks, quarries, sand pits, etc., they are a permanent and indispensable equipment. The longevity and safety of a wire rope cableway is largely dependent on the durability of its track or supporting cable. From this cable are suspended the loads it carries and over which run the wheels of the traveler or carrying device. The smooth

Cableway Erected at Building of Dam

CABLEWAY HANDLING LOGS

round bearing of our PATENT FLATTENED STRAND wire rope presents to the wheels of the carrier a wearing surface very much like a round steel rod and in which each exterior wire is equally exposed to frictional wear. Likewise in this construction the track rope will not flatten under excessive loads nor can there be undue internal friction between the wires. The absolutely correct construction of our PATENT FLATTENED STRAND wire rope has caused it to be used very extensively as cableway track ropes, and in which service it carries greater loads very much longer than the old round strand type of wire rope, and with a consequent economy of operation. We make it for this purpose in six strands of twenty-five wires each (6x25), and of the high grade **Hercules** steel suitable to the weight and frequency of the loads it will be required to carry.

For the hoisting and hauling ropes and all other ropes used on cableways, we recommend our 6x19 **Hercules** wire rope.

Mining

BRINGING ores to the surface economically is a problem of every mining operation. Most of them use wire rope in their hoisting or haulage or inclines, and this work can be done neither as cheaply nor safely as it should be if the rope is not equal to its task. The vast amount of rope employed in this very important service, and the difficulties encountered by many operators experimenting with inferior and improperly constructed ropes, has given us cause to make these circumstances a particular study, and the results have been very gratifying. If we can know what is required of a wire rope and the details of the working conditions under which it must operate, its selection may safely be left with us. A wide and varied experience in the manufacture of mining ropes and close observation of their operation has taught us how they should be constructed and of what material, and we have them working successfully under every condition, handling mine products of every kind in every mining district of the country. In long mine haulage, where there are many idlers, rollers, etc., and numbers of bends and sharp angles, the PATENT FLATTENED STRAND construction, coarse laid, with its increased wearing surface and greater flexibility, will usually outwear two or three round strand ropes, even when of equally good material. This is likewise true of the PATENT FLATTENED STRAND construction in hoisting service where the rope, rapidly lifting its heavy loads, works constantly in the hoisting and guide sheaves, winding around the drums, and each external wire, taking an equal share of the wear, naturally and easily extends its serviceableness and preserves its dependability. A critical consideration of the wire rope feature of any ore handling equipment looking to the points of economy and general trustworthiness will make manifest the decided advantages of the PATENT FLATTENED STRAND wire rope. In the manufacture of the round strand type of haulage and hoisting mine ropes the proper selection of material is of great necessity. We make them in the **Hercules** steel, Special steel and crucible steel, 6 x 19 for hoisting and 6 x 7 for haulage, and recommend them according to the severity of the work they will be called upon to do.

LOG LOADER

Wire Rope in Logging

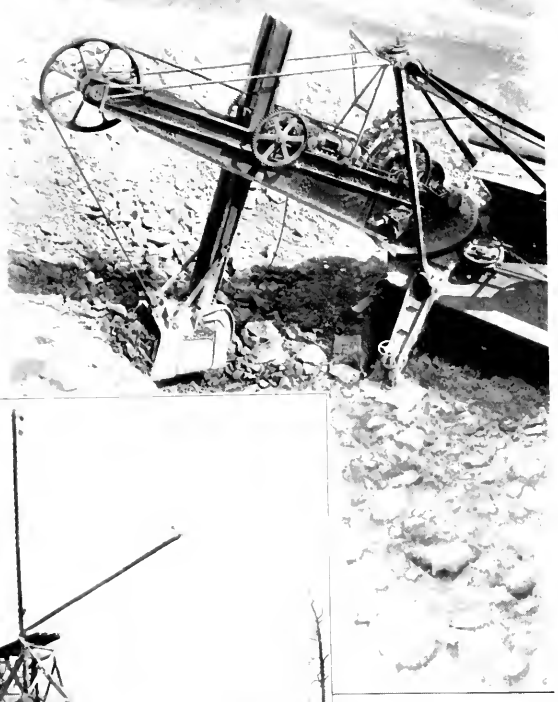
PRESENT day methods of logging vary according to the peculiar necessities of each timber section and many different systems are successfully employed. Of the many ways used in getting logs out of the woods, there are cableway skidders of different types, pull boats, snaking machines, donkey engine haulage, and at the cars combination loaders and skidders and several different types of loading machines, and every one of them essentially wire rope systems. As a consequence the successful operation of any one of them cannot be accomplished unless the wire rope with which it is equipped is equal in every respect to the demands made upon it. Logging as a general rule, by whatever system it is done, subjects wire rope to enormous strains, sudden jerks, severe grinding around stumps, over sharp stones, etc., that make necessary a rope of exceptional dependability, and because of the frequent difficulty in getting new ropes into the woods in cases of break down, and the consequent loss by suspended operations, this is especially true. The exceedingly high breaking strength of our **Hercules** logging rope together with its tough and flexible character has placed it far ahead of every rope used in logging, and as a logical result **Hercules** handles the great bulk of logs in every timber section of the United States, and with every logging

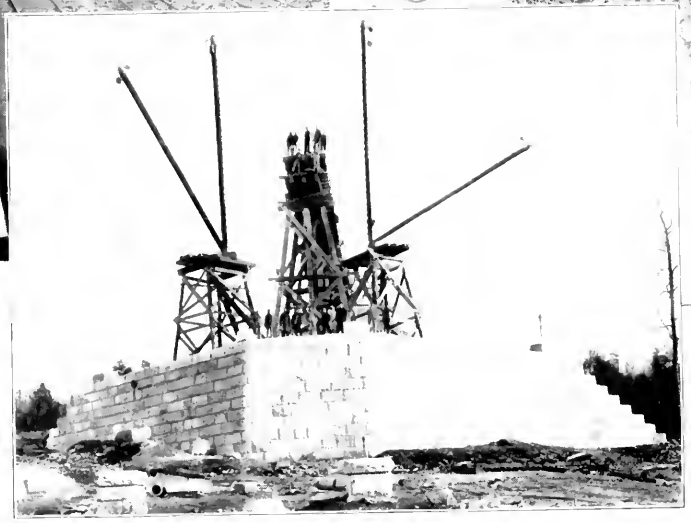
LOADING

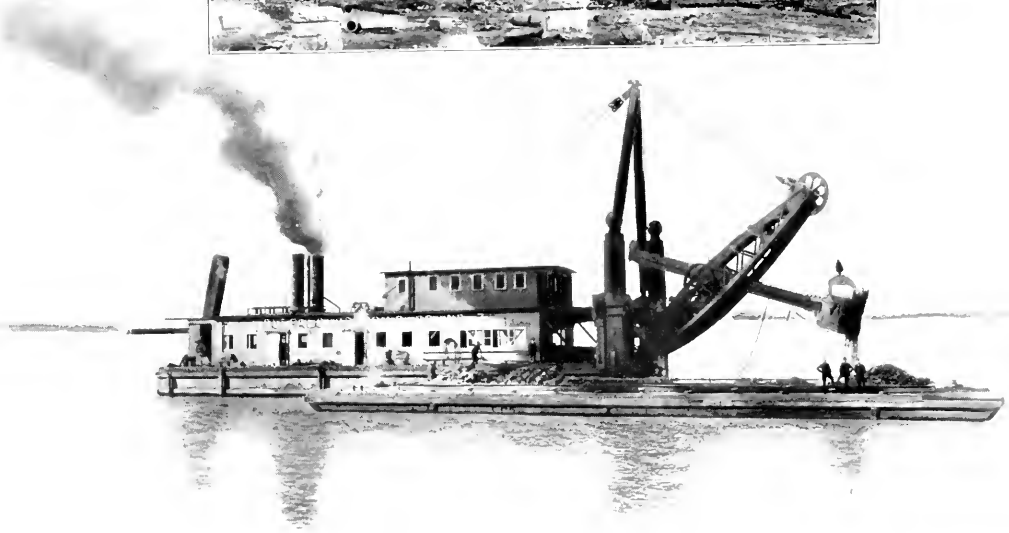
SKIDDING

system now in use. In the greater number of cases **Hercules** 6x19 (six strand, nineteen wires each) is used, though in some instances on loaders, saw mills, skidders, PATENT FLATTENED STRAND **Hercules** is best adapted. It is well that we know the nature of the working conditions encountered that we may recommend the **Hercules** that will best and most cheaply do the work required of it.

PULL BOAT







Hercules Wire Rope

Trade mark registered

The illustrations on the opposite page show four of the most severe uses to which wire rope is commonly subjected, and in which service ordinary steel wire ropes prove inadequate, and for reasons at once apparent to those acquainted with the prevailing conditions.

Dredges and Steam Shovels

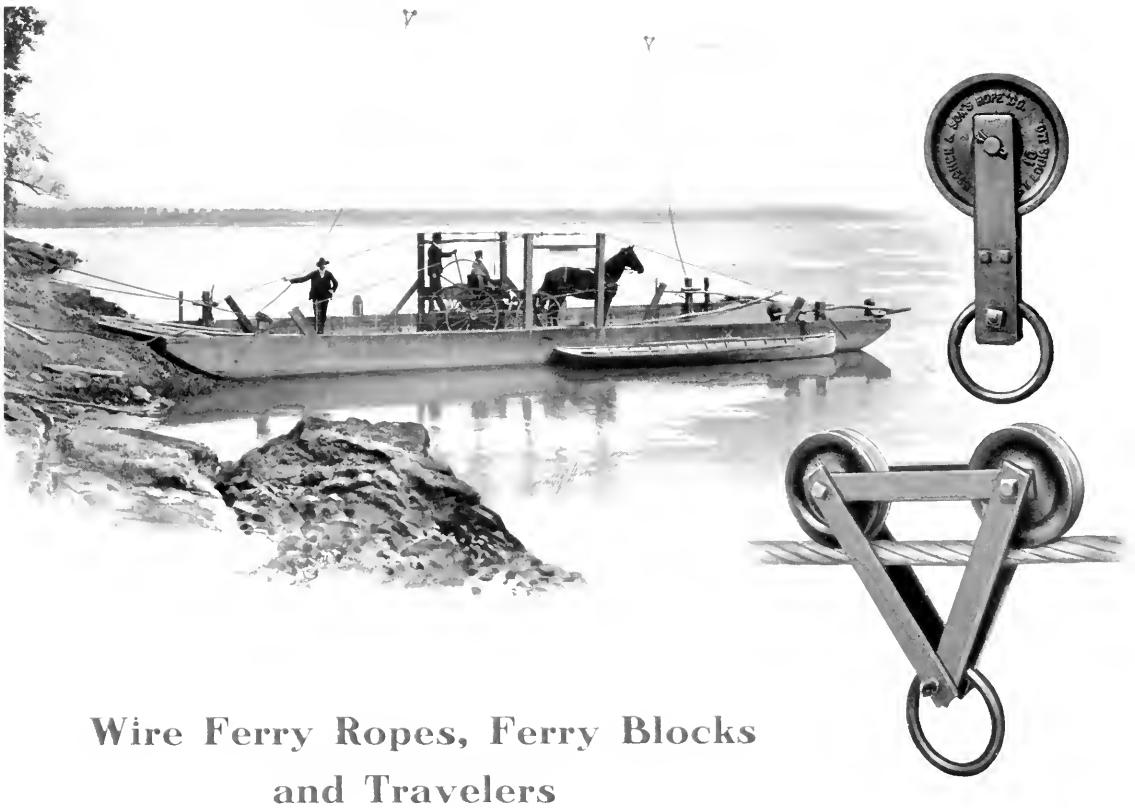
As far as the wire rope is concerned, the working conditions in dredge and steam shovel operations are quite similar. Probably there is no other class of service in which wire rope receives as severe treatment. Inasmuch as the strain on the hoisting rope cannot be anticipated, a rope of the highest possible tensile strength is a requisite. With this property must also be flexibility in an unusual degree, as several sharp and reversed bends over sheaves and drums are unavoidable. **Hercules** wire rope is remarkably well fitted for this duty, as its successful use has demonstrated. It is supplied in both the PATENT FLATTENED STRAND and Round Strand constructions, which ever is best adapted to the requirements of the machine. Where the rope works in water, as in deep water dredging or drainage canal digging, we especially prepare it during course of construction with an internal filler, and coat the exterior with a shield, both of our own preparation. It is the "cheapest per yard" rope obtainable. The greater number of dredge and shovel operators use **Hercules** exclusively.

Quarrying

The handling of building stone, marble and granite in the average quarry is particularly severe on wire rope, as the lifting of the blocks is usually preceded by quick and hard jerks to begin their movement and the loads frequently are very heavy. For stone handling of every kind the hoisting rope which is invariably most economical is **Hercules** tough, strong, safe and durable.

Derricks

The lifting of building material of every sort in construction work is more economically accomplished with the highest grade of wire rope—which is **Hercules.** In this service a rope of the highest breaking strength and greatest dependability is desirable, and this is particularly true where in the placing of material in position the safety of the workmen must be considered.



Wire Ferry Ropes, Ferry Blocks and Travelers

Wire rope in ferry service is much superior to hemp ropes and for many reasons. Being round and smaller, the sheaves of the block or traveler run more smoothly and rapidly, thus eliminating the sudden jerks caused by checking which is common with hemp rope. Where the rope is used in water it does not rot or become water-clogged and clumsy, as does hemp rope. They are cheaper than hemp rope of equal strength and properly installed will last for years. A hemp rope soaked with water will weigh more than four times as much as wire rope. The wire rope shown under the sheaves of the traveler in the illustration is the PATENT FLATTENED STRAND construction, which in hard service is the best construction of wire rope obtainable. The duty of a ferry rope is of a similar nature to that of the track rope of a cableway or aerial tramway in which service PATENT FLATTENED STRAND wire rope is so extensively used, and its larger, smoother wearing service obtains here the same satisfactory results.

For ferry travelers and blocks of the designs illustrated, see price list, page 81

Suspension Bridges and Bridge Cables

We manufacture bridge cables in lengths required for different installations. These bridge cables are referred to in detail on page 65, and our prices for them are based upon the length and size required.

We make a specialty of all of the iron work required for the building of wire rope suspension bridges, and can furnish such material complete with the bridge cables.

The cut shows our Ernst patent adjustable hanger rods for use on bridge work.

Wire Rope Transmission

The use of an endless wire rope, made especially for the purpose, running over sheaves instead of an ordinary belt and pulley, constitutes the transmission of power by wire rope. Power can by this method be transmitted in any desired direction—up or down hill, across rivers, around buildings or obstructions of any kind—and to any distance within the limit of two miles.

The ropes hang free in the air and require no protection from the weather except an occasional coating of warm coal tar and linseed oil, which can be applied to the rope by pouring from a can into the groove of the sheave while running.

Wire rope transmission can be applied with great profit and economy in every instance where the distance exceeds 100 feet, and in many cases where the distance is as short as 50 feet. The main feature, however, is *distance*, and the further power is to be transmitted the better the results obtained under this system. When the distance materially exceeds 300 or 400 feet, a rope transmission should be divided into two or more equal parts by means of one or more intermediate stations.

The rope generally used is composed of six strands of seven wires each, as per cross-section on page 58; ropes with nineteen wires should be substituted where sheaves of ample diameter cannot be used on account of certain conditions of position or speed of shaft. The latter ropes are more flexible, but the wires are finer and will not withstand wear as well as the coarser wires of the seven-wire rope.

If for any reason it is desirable to use smaller sheaves than those given in the table, the requisite power may be obtained by using hoisting rope of nineteen wires, illustrated on page 58, of a larger size than given in the table, instead of transmission ropes, because of its greater pliability. Thus a half-inch hoisting rope may be used over a three-foot wheel, and will transmit as much power as a $\frac{5}{8}$-inch transmission rope over a four-foot wheel.

On page 81 will also be found the proper diameter of sheaves to transmit a given amount of power. A satisfactory general rule for determining the proper relation of rope to sheaves is to make the diameter of the sheaves 150 times the diameter of the rope. The groove of the sheaves should be deep, with flaring flanges and lined with rubber.

Special care should be taken that sheaves are well balanced, as the centrifugal force is great. They should be fitted true on the shaft, and the shaft set at right angles to the line of transmission. If the sheaves wabble and run out of line they will cause the rope to vibrate and jerk.

In all cases see that the sheaves over which the rope runs are properly lined with an elastic substance—leather, hard rubber, wood or tarred rope, rubber preferred. This is imperative.

Speed

This is a very important element in transmitting power, for our experience and observation have been that nearly every transmission that has proven a failure has been **because speed was too high.** Our best results on small sheaves have been obtained by running the rope at 1,200 to 1,600 feet per minute, and on large sheaves the speed can be kept down to good advantage and best results. At high speed the necessity that the sheaves be supported so they are solid and unyielding is all the greater, and this cannot be too strongly impressed in any case. The larger the wheels and the lower the velocity the longer will be the life of the rope. Tightening sheaves, guide sheaves, and all other unnecessary sheaves, should be avoided as much as possible, as each extra sheave adds to the wear of the rope. If extra friction is required it should be obtained by the use of larger wheels or a little heavier rope of nineteen wires to the strand. In construction attention must be given to the following points:

1. Be sure the wheels are bored true and set true on the shaft.
2. Set the shafts exactly parallel.
3. Bring the wheels exactly in line.
4. Avoid the use of tapered keys.

Full information and advice given upon application. Correspondence solicited.

Table of transmission of power by wire ropes page 81.

To Ascertain the Length of Rope to be Spliced Endless

In most cases the rope can be spliced endless, and in such cases the rope can be forwarded spliced ready to go on. We can furnish rope ready spliced by giving us the exact distance from center to center of shaft and the exact diameter of the sheaves over which the rope is to run. This measure can be secured best by stretching a wire from shaft to shaft, marking the distance from center to center of shaft and carefully measuring the wire.

In cases where the endless rope cannot be put on, the rope has to be placed around the sheaves, drawn taut by pulley blocks, and the splices made on the spot. See Fig. 1 in diagram of splices.

The Necessary Tools for Splicing

A hammer and a sharp cold chisel for cutting off ends of strands; a steel point or marlin spike for opening strands; two pieces heavy tarred marlin or thin rope with sticks; a pocket knife for cutting the hemp core; a wooden mallet and block.

Splices

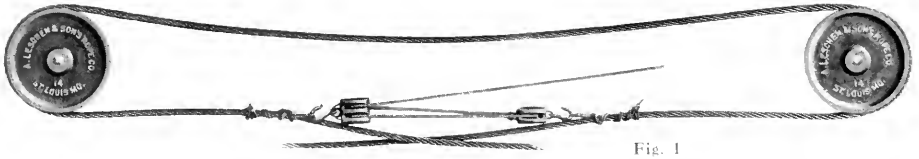


Fig. 1

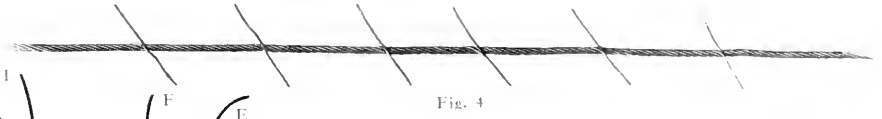


Fig. 4

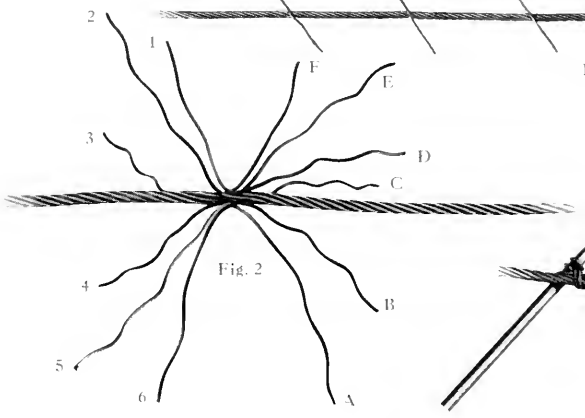


Fig. 2

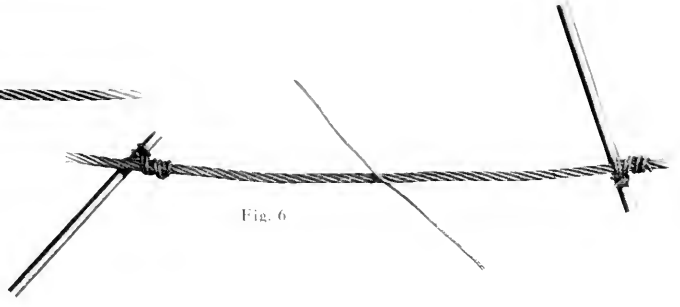


Fig. 6

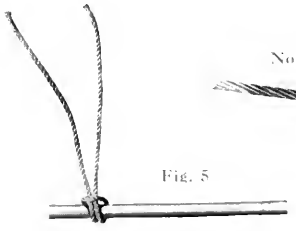


Fig. 5

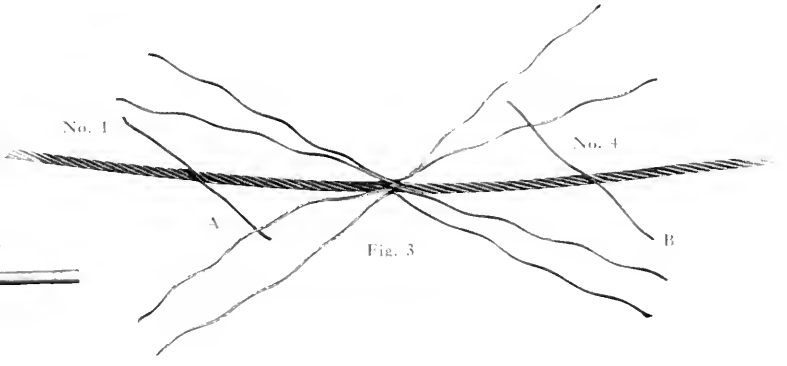


Fig. 3

The splices for running rope are all of the kind known as the long splice, and should be put in 20 feet long or longer. The diameter of the rope is not increased or diminished, or the strength of the rope perceptibly weakened by this splice, and after it has run for a day or two the locality of the splice cannot be detected by the most careful examination.

We here give a diagram of splices fully illustrating the manner of splicing in all its stages from beginning to end, and by a little study of these illustrations and carefully following the directions, any man of ordinary genius can make a successful splice on first trial.

Directions for Splicing Wire Rope with Long Running Splices

Wire rope is susceptible of the most perfect splicing. A smoother and better splice can be put in wire rope than in any other kind of rope, for the simple reason that it is made with a view to this purpose. It has the desired number of strands, namely, six, and a hemp core, which provides a place for fastening the ends. It is a plain, simple process, and but the work of an hour for any one to learn.

First—Place the rope around the sheaves and heave it tight with block and fall. (See Fig. 1.) The blocks should be hitched far enough apart so as to give room between to make a 20-foot splice. A small clamp may be used to prevent the lashing from slipping on the ropes where the blocks are hitched. (See Fig. 1.) Next, see that the ropes overlap about 20 feet; about 10 feet each way from the center. Next, mark the center of both ropes with a piece of chalk, or by tying on a small string. Now proceed to splice, with the blocks remaining taut when it is necessary, but the better way is to remove the blocks, throw off the rope from the sheaves, let it hang loose on the shafts, and proceed with the splice on the ground or floor, or scaffold, as the case may be.

Second—Unlay the strands of both ends of the rope for a distance of 10 feet each. Next cut off the hemp cores, then bring the bunches of strands together so that the opposite strands will interlock regularly with each other. (See Fig. 2.)

Third—Unlay any strand, *a*, and follow up with one strand of the other end, laying it tightly in open groove made by unwinding *a*; make twist of the strand agree exactly with the twist of the open groove. Proceed with this until all but twelve inches of one are laid in, or till *a* has become ten feet long. Next, cut off *a*, leaving an end about twelve inches long. (See Fig. 3.)

Fourth—Unlay a strand, 4, of the opposite end and follow with strand *d*, laying it in open groove as before and treating this precisely as in the first case. (See Fig. 2.) Next pursue the same course with *b* and 2, stopping four feet short of the first set. Next with 5 and *c*, stopping as before, then with *c* and 3; and lastly with 6 and *f*. The strands are now all laid in with ends four feet apart as shown in Fig. 4.

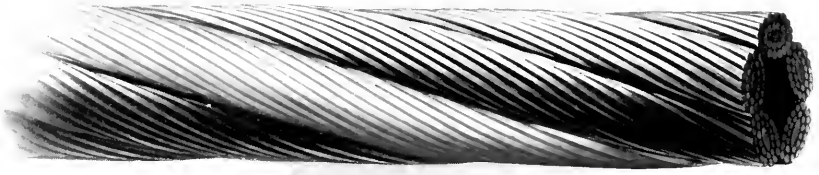
Fifth and last—The ends must now be secured without enlarging the diameter of the rope. Take two rope clamps (see Fig. 5) and fasten them to the rope as shown in Fig. 6; twist them in opposite directions, thus opening the lay of rope. Next, with a knife cut out the hemp core about twelve inches on each side. Now straighten the ends and slip them into the place occupied by the core, then twist the clamps back, closing up the rope, taking out any slight inequality with a wooden mallet. Next, shift the clamps and repeat the operation at the other five places, and the splice is made.

If the rope becomes slack in time and runs too loose, a piece can be cut out and the rope tightened up. This will require a piece of rope about 40 feet long, and two splices, one splice to put on the piece of rope, and the other splice to join the two ends together.

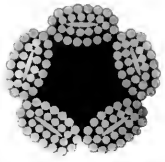
For list prices for splicing done at factory, see page 81.

HERCULES PATENT FLATTENED STRAND

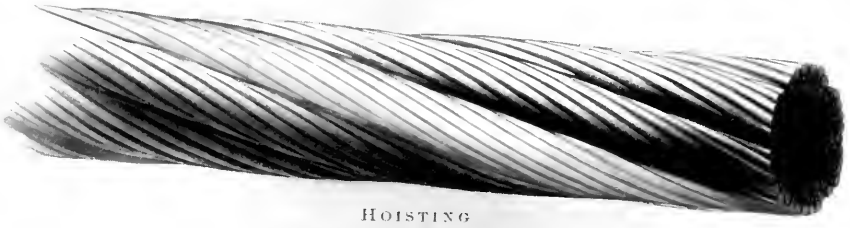
(Trade mark registered)



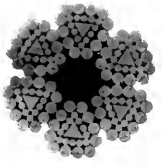
HOISTING



Style A
5 Strands
28 Wires
to the Strand

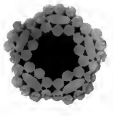


HOISTING

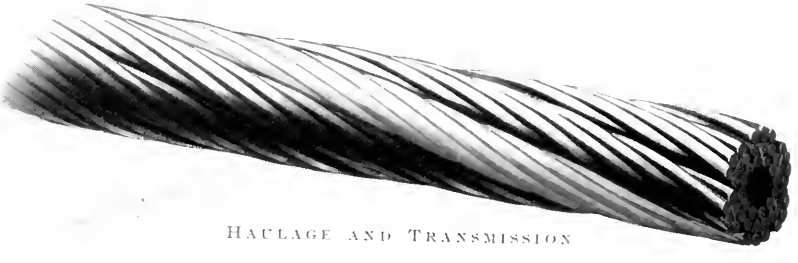


Style B
6 Strands
25 Wires
to the Strand

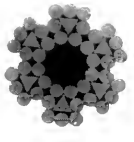
HAULAGE AND TRANSMISSION



Style C
5 Strands
9 Wires
to the Strand



HAULAGE AND TRANSMISSION



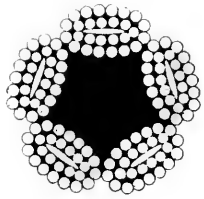
Style D
6 Strands
8 Wires
to the Strand

PATENT FLATTENED STRAND
HERCULES WIRE ROPE

(Trade mark registered)

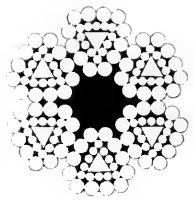
Hoisting Rope Hemp Center

Illustrated on opposite page See description page 9
For quality, see page 12



Style A
5 Strands
28 Wires
to the Strand

Telegraph Name	Diameter in Inches	Price per Foot in Cents	Approximate Breaking Strain in Tons of 2,000 Pounds	Allowable Working Strain in Tons of 2,000 Pounds	Average Weight of Rope per Foot	Minimum Size of Drums or Sheaves in Feet
Fable	1/2	20 3/4	13 1/2	2.7	.44	2 3/4
Fabordao	9/16	25	19	3.8	.54	3
Fact	5/8	28	22 1/2	4.5	.73	3 1/2
Fallow	3/4	37 1/2	32	6.4	1.00	4
False	7/8	49	40 1/2	8.1	1.35	4 1/2
Fancy	1	60	56	11.2	1.80	5
Fantasm	1 1/16	71	67	13.4	2.30	6
Farner	1 1/4	89	84	16.8	2.80	7
Farobien	1 3/8	112	106	21.2	3.40	7 1/2
Farther	1 1/2	137	124	24.8	1.00	8
Fassband	1 5/8	156	140	28.0	4.75	8 1/2
Fastness	1 3/4	208	168	33.6	5.40	9
Favorite	2	225	211	42.2	7.50	11
Fashion	2 1/4	285	260	52	9.25	12



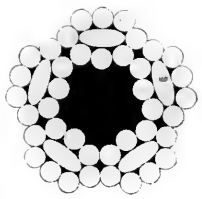
Style B
6 Strands
25 Wires
to the Strand

PATENT FLATTENED STRAND
HERCULES WIRE ROPE

(Trade mark registered)

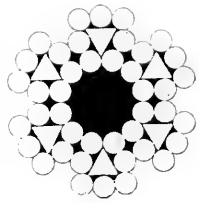
Haulage and Transmission Rope Hemp Center

Illustrated on opposite page See description page 9
For quality, see page 12



Style C
5 Strands
9 Wires
to the Strand

Telegraph Name	Diameter in Inches	Price per Foot in Cents	Approximate Breaking Strain in Tons of 2,000 Pounds	Allowable Working Strain in Tons of 2,000 Pounds	Average Weight of Rope per Foot	Minimum Size of Drums or Sheaves in Feet
Graceful	1/2	16 1/4	13	2.6	.44	3 3/4
Grading	5/8	25	21	4.2	.73	4 1/2
Graduate	3/4	35	30	6	1.00	5 1/4
Gramercy	7/8	44	38	7.6	1.35	6
Grampus	1	58	53	10.6	1.80	6 3/4
Grandest	1 1/8	70	64	12.8	2.30	8
Graphite	1 1/4	88	80	16	2.80	9 1/4



Style D
6 Strands
8 Wires
to the Strand

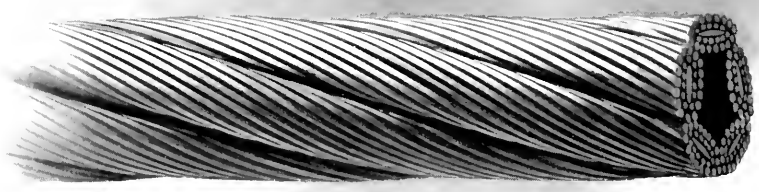
Patented Flattened Strand rope has 150 per cent. more wearing surface than ordinary rope and is exceedingly flexible. When desired with a wire center, prices will be made on application.

We make to order special rope for special purposes with any combination of wires or styles of twist or lay.

Like all good things, Hercules rope is being imitated and common steel rope is being palmed off on the consumer as Hercules rope. So-called Plough Steel rope is also being sold as just as good as Hercules. To protect ourselves and the consumer, we have adopted the word "Hercules" in connection with a *colored* strand as our trade mark. Be sure to get the genuine *colored* strand Hercules rope.

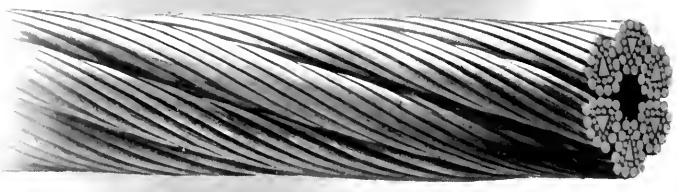
Tell us what you want to use the rope for and we will suggest the proper rope for the purpose.

PATENT FLATTENED STRAND

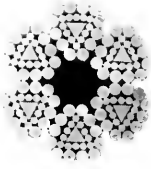


HOISTING

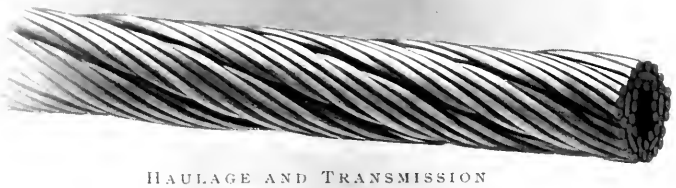
Style A
5 Strands
28 Wires
to the Strand



HOISTING



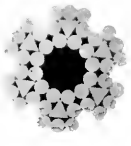
Style B
6 Strands
25 Wires
to the Strand



HAULAGE AND TRANSMISSION

Style C
5 Strands
9 Wires
to the Strand

HAULAGE AND TRANSMISSION



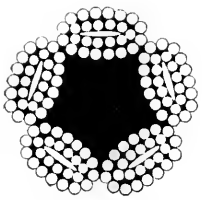
Style D
6 Strands
8 Wires
to the Strand

PATENT FLATTENED STRAND
SPECIAL STEEL

(Trade mark registered)

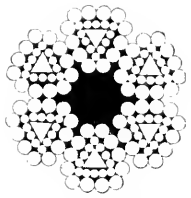
Hoisting Rope

Illustrated on opposite page — See description page 9
For quality, see page 13



Style A
5 Strands
28 Wires
to the Strand

Telegraph Name	Diameter in Inches	Price per Foot in Cents	Approximate Breaking Strain in Tons of 2,000 Pounds	Allowable Working Strain in Tons of 2,000 Pounds	Average Weight of Rope per Foot	Minimum Size of Drums or Sheaves in Feet
Iasso	1/2	17 1/2	11.1	2.22	.44	1 1/2
Iatrico	9/16	19 1/2	14.0	2.8	.54	1 3/4
Ibanto	5/8	22 1/2	17.0	3.4	.73	2 1/4
Ibdare	3/4	30	24.5	4.9	1.00	3
Iberico	7/8	38	33.0	6.6	1.35	3 1/2
Ibhar	1	48	43.0	8.6	1.80	4
Ibidem	1 1/8	59	54.0	10.8	2.30	4 1/2
Ibimu	1 1/4	70	64.0	12.8	2.80	5
Ibzan	1 1/2	105	93.0	18.6	4.00	5 3/4
Icaja	1 3/4	155	127	25.4	5.40	7 1/4
Icastico	2	177	162	32.4	7.50	8
Icerimus	2 1/4	220	204	40.8	9.25	8 1/2



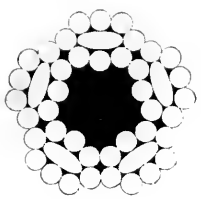
Style B
6 Strands
25 Wires
to the Strand

PATENT FLATTENED STRAND
SPECIAL STEEL

(Trade mark registered)

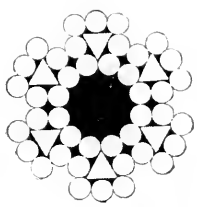
Haulage and Transmission Rope

Illustrated on opposite page — See description page 9
For quality, see page 13



Style C
5 Strands
9 Wires
to the Strand

Telegraph Name	Diameter in Inches	Price per Foot in Cents	Approximate Breaking Strain in Tons of 2,000 Pounds	Allowable Working Strain in Tons of 2,000 Pounds	Average Weight of Rope per Foot	Minimum Size of Drums or Sheaves in Feet
Idalgo	5/8	11	6.1	1.2	.25	2
Ideable	1/2	14	10.5	2.1	.44	2 1/2
Idealum	5/8	18	16.5	3.3	.73	3 1/2
Ideamos	3/4	27	23	4.6	1.00	4 1/2
Identico	7/8	35	31	6.2	1.35	5
Identism	1	45	40	8	1.80	5 3/4
Ideogram	1 1/8	54	50	10	2.30	6 1/4
Idiograph	1 1/4	68	62	12.4	2.80	7 1/4
Idisogar	1 3/8	80	73	14.6	3.30	8
Idorol	1 1/2	93	85	17	4.40	8 1/2



Style D
6 Strands
8 Wires
to the Strand

Patented Flattened Strand rope has 150 per cent. more wearing surface than ordinary rope and is exceedingly flexible.
When desired with a wire center, prices will be made on application.
We make to order special ropes for special purposes with any combination of wires or styles of twist or lay.
Tell us what you want to use the rope for and we will suggest the proper rope for the purpose.

PATENT FLATTENED STRAND CRUCIBLE CAST STEEL

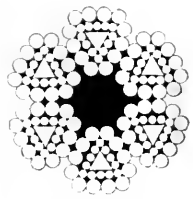
Hoisting Rope

Illustrated on page 52 — See description page 9

For quality, see page 13

Style A
5 Strands
28 Wires
to the Strand

Telegraph Name	Diameter in Inches	Price per Foot in Cents	Approximate Breaking Strain in Tons of 2,000 Pounds	Allowable Working Strain in Tons of 2,000 Pounds	Average Weight of Rope per Foot	Minimum Size of Drums or Sheaves in Feet
Abactor	1/2	14 1/2	9 1/2	1.9	.44	1 1/2
Abandon	5/8	18 1/4	15	3.0	.73	2 1/4
Abused	3/4	24	21	4.2	1.00	3
Abbott	7/8	30	29	5.8	1.35	3 1/2
Abdicate	1	39 1/2	38	7.6	1.80	4
Abductor	1 1/8	50	47	9.4	2.30	4 1/2
Abelmask	1 1/4	59 1/2	56	11.2	2.80	5
Abhoring	1 3/8	73	69	13.8	3.40	5 1/2
Abreption	1 1/2	86	81	16.2	4.00	5 3/4
Abrupted	1 5/8	96	94	18.8	4.75	6 1/4
Absolute	1 3/4	121	109	21.8	5.40	7 1/4
Abuseful	2	144	140	28.0	7.50	8
Absurd	2 1/4	182	176	35.2	9.25	8 1/2



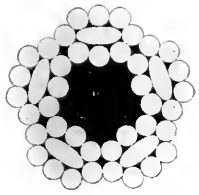
Style B
6 Strands
25 Wires
to the Strand

PATENT FLATTENED STRAND CRUCIBLE CAST STEEL

Haulage and Transmission Rope

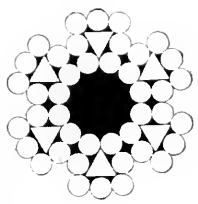
Illustrated on page 52 — See description page 9

For quality, see page 13



Style C
5 Strands
9 Wires
to the Strand

Telegraph Name	Diameter in Inches	Price per Foot in Cents	Approximate Breaking Strain in Tons of 2,000 Pounds	Allowable Working Strain in Tons of 2,000 Pounds	Average Weight of Rope per Foot	Minimum Size of Drums or Sheaves in Feet
Kerns	3/8	7	5	1.0	.25	2
Keeping	1/2	10	9	1.8	.44	2 1/2
Kelter	5/8	14	14	2.8	.73	3 1/2
Kernel	3/4	20 1/2	20	4.0	1.00	4 1/2
Ketchup	7/8	27 1/2	27	5.4	1.35	5
Keystone	1	35	36	7.2	1.80	5 3/4
Kicker	1 1/8	45	45	9.0	2.30	6 1/4
Kilogram	1 1/4	54	54	10.8	2.80	7 1/4
Kilone	1 3/8	64	64	12.8	3.30	8
Koler	1 1/2	75	75	15.0	4.40	8 1/2



Style D
6 Strands
8 Wires
to the Strand

Patent Flattened Strand rope has 150 per cent. more wearing surface than ordinary rope and is exceedingly flexible. When desired with a wire center, prices will be made on application.

We make to order special ropes for special purposes with any combination of wires or styles of twist or lay.

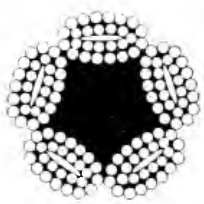
Tell us what you want to use the rope for and we will suggest the proper rope for the purpose.

PATENT FLATTENED STRAND SWEDES IRON

Hoisting Rope

Illustrated on page 52 See description page 9 For quality, see page 13

Telegraph Name	Diameter in Inches	Price per Foot in Cents	Approximate Breaking Strain in Tons of 2000 Pounds	Allowable Working Strain in Tons of 2000 Pounds	Average Weight of Rope per Foot	Minimum Size of Drums or Sheaves in Feet
Dabamas	$\frac{3}{8}$	$9\frac{1}{2}$	2.3	.5	.20	1
Dabler	$\frac{7}{16}$	$10\frac{1}{2}$	4	.8	.38	2
Dado	$\frac{1}{2}$	13	5	1.0	.47	$2\frac{1}{2}$
Dafodil	$\frac{9}{16}$	$15\frac{1}{2}$	6	1.2	.57	3
Damage	$\frac{5}{8}$	21	9	1.8	.83	$3\frac{1}{2}$
Dancer	$\frac{3}{4}$	26	13	2.6	1.20	4
Dangerous	1	34	17	3.4	1.58	$4\frac{3}{4}$
Dangler	$1\frac{1}{8}$	43	21	4.2	2.00	$5\frac{1}{4}$
Dareful	$1\frac{1}{4}$	52	28	5.6	2.50	$5\frac{3}{4}$
Darkish	$1\frac{3}{8}$	$62\frac{1}{2}$	34	6.8	3.00	$6\frac{1}{4}$
Darling	$1\frac{1}{2}$	74	40	8.0	3.65	$6\frac{3}{4}$
Dastard	$1\frac{5}{8}$	82	45	9.0	4.15	$7\frac{1}{2}$
Dauber	$1\frac{3}{4}$	104	54	10.8	5.00	9
Daughter	2	120	66	13.2	6.30	$10\frac{3}{4}$
Dauntless	$2\frac{1}{4}$	152	75	15.0	8.00	$11\frac{1}{2}$



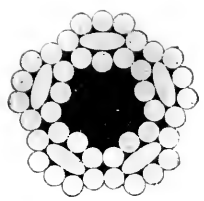
Style A
5 Strands
28 Wires
to the Strand

PATENT FLATTENED STRAND SWEDES IRON

Haulage and Transmission Rope

Illustrated on page 52 See description page 9 For quality, see page 13

Telegraph Name	Diameter in Inches	Price per Foot in Cents	Approximate Breaking Strain in Tons of 2000 Pounds	Allowable Working Strain in Tons of 2000 Pounds	Average Weight of Rope per Foot	Minimum Size of Drums or Sheaves in Feet
Glacial	$\frac{1}{2}$	$8\frac{1}{4}$	$4\frac{1}{2}$	.9	.38	$3\frac{1}{2}$
Gladen	$\frac{5}{8}$	$12\frac{1}{2}$	7	1.4	.60	$4\frac{3}{4}$
Gladiator	$\frac{3}{4}$	$17\frac{1}{2}$	10	2.0	.87	6
Glamour	$\frac{7}{8}$	22	$13\frac{1}{2}$	2.7	1.20	$6\frac{3}{4}$
Glance	1	29	18	3.6	1.58	$7\frac{3}{4}$
Glaring	$1\frac{1}{8}$	$36\frac{1}{2}$	$22\frac{1}{2}$	4.5	2.00	$8\frac{1}{2}$
Glover	$1\frac{1}{4}$	45	27	5.4	2.50	$9\frac{1}{2}$



Style C
5 Strands
9 Wires
to the Strand

A rope of Patent Flattened Strand Swedes iron gives most satisfactory results in elevator service.

Patented Flattened Strand rope, being extremely flexible, is an ideal construction for use on elevators.

Having a wearing service of 150 per cent. more than ordinary rope means longer service and a distinct saving in wear of sheaves and pulleys.

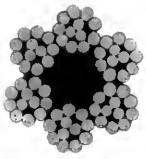
When desired with a wire center, prices will be made on application.

We make to order special ropes for special purposes with any combination of wires or styles of twist or lay.

Tell us what you want to use the rope for and we will suggest the proper rope for the purpose.

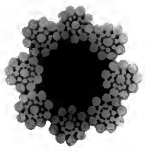
HERCULES WIRE ROPE

(Trade mark registered)



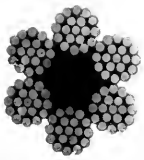
6 Strands
12 Wires
to the Strand

HOISTING



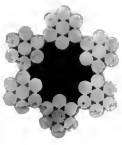
8 Strands
19 Wires
to the Strand

HOISTING



6 Strands
19 Wires
to the Strand

HOISTING



6 Strands
7 Wires
to the Strand

HAULAGE

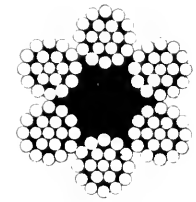
HERCULES WIRE ROPE

(Trade mark registered)

Hoisting Rope Hemp Center

Illustrated on opposite page See description page 10 For quality, see page 12

Telegraph Name	Diameter in Inches	Price per Foot in Cents	Approx. Breaking Strain in Tons of 2,000 lbs.	Allowable Working Strain in Tons of 2,000 lbs.	Average Weight per Foot	Minimum Size of Drums or Sheaves in Feet
Harness	5/8	14 1/2	7	1.4	0.22	2
Harsh	5/16	15	10	2	0.30	2 1/2
Hasty	1/2	16 1/2	12 1/2	2.5	0.39	2 3/4
Hasp	3/16	20	17	3.4	0.50	3
Hatchet	5/8	22 1/2	20	4	0.62	3 1/2
Hauling	3/4	30	29	5.8	0.89	4
Havoc	7/8	39	36	7.2	1.20	4 1/2
Hawking	1	49	50	10	1.58	5
Haying	1 1/8	57 1/2	60	12	2.00	6
Hazard	1 1/4	71 1/2	76	15.2	2.45	7
Hazel	1 3/8	90	96	19.2	3.00	7 1/2
Hateful	1 1/2	109	113	22.6	3.55	8
Haven	1 5/8	125	128	25.6	4.15	8 1/2
Harping	1 3/4	166	157	31.4	4.85	9
Harass	2	181	191	38.2	6.30	11
Hansard	2 1/4	229	238	47.6	8.00	12
Hansom	2 1/2	262	266	53.2	9.85	13 1/2



6 Strands
19 Wires
to the Strand

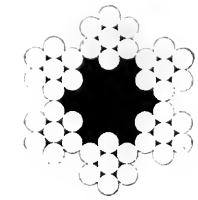
HERCULES WIRE ROPE

(Trade mark registered)

Haulage Rope Hemp Center

Illustrated on opposite page See description page 10 For quality, see page 12

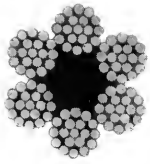
Telegraph Name	Diameter in Inches	Price per Foot in Cents	Approx. Breaking Strain in Tons of 2,000 lbs.	Allowable Working Strain in Tons of 2,000 lbs.	Average Weight per Foot	Minimum Size of Drums or Sheaves in Feet
Encamp	1/2	13	11 1/2	2.3	0.39	3 3/4
Endeavor	5/8	20	18 1/2	3.7	0.62	4 1/2
Enforce	3/4	28	25 1/2	5.1	0.89	5 1/4
Engaged	7/8	35	33 1/2	6.7	1.20	6
Enjoiner	1	46	47	9.4	1.58	6 3/4
Enlarged	1 1/8	56	58	11.6	2.00	8
Enriching	1 1/4	70 1/2	74	14.8	2.45	9 1/4



6 Strands
7 Wires
to the Strand

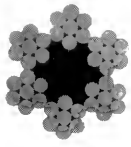
Like all good things, Hercules rope is being imitated and common steel rope is being palmed off on the consumer as Hercules rope. So-called Plough Steel rope is also being sold as just as good as Hercules. To protect ourselves and the consumer, we have adopted the word "Hercules" in connection with a *colored* strand as our trade mark. Be sure to get the genuine *colored* strand Hercules rope.

Tell us what you want to use the rope for and we will suggest the proper rope for the purpose.



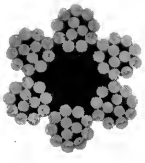
1
6 Strands
19 Wires
to the Strand

HOISTING

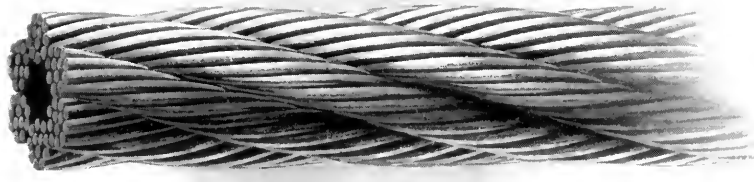


2
6 Strands
7 Wires
to the Strand

HAULAGE AND TRANSMISSION OR GALVANIZED IRON



3
6 Strands
12 Wires
to the Strand



GALVANIZED

4

TILLER

5

7 WIRE GALVANIZED STRAND

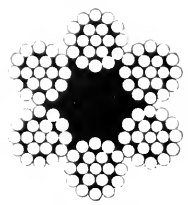
SPECIAL STEEL

(Trade mark registered)

Hoisting Rope — Hemp Center

See Fig. 1, opposite page — See description page 10 — For quality, see page 13

Telegraph Name	Diameter in Inches	Price per Foot in Cents	Approximate Breaking Strain in Tons of 2,000 Pounds	Allowable Working Strain in Tons of 2,000 Pounds	Average Weight of Rope per Foot	Minimum Size of Drums or Sheaves in Feet
Tabard	1/4	10 1/2	2.70	0.54	0.10	1/2
Talaky	5/16	10 3/4	4.05	0.81	0.15	2/3
Talent	3/8	11	5.78	1.15	0.22	1
Talisman	7/16	11 1/2	7.08	1.56	0.30	1 1/4
Tallied	1/2	12 1/2	10.1	2.02	0.39	1 1/2
Tambour	9/16	14	12.7	2.54	0.50	1 3/4
Tamis	5/8	16 1/2	15.8	3.16	0.62	2 1/4
Tandem	11/16	22	22	4.40	0.89	3
Tangent	3/4	28	30	6.00	1.20	3 1/2
Tankard	1	36	39	7.80	1.58	4
Tanner	1 1/8	45	49	9.80	2.00	4 1/2
Taper	1 1/4	55	58	11.6	2.45	5
Tapestry	1 3/8	67	72	14.4	3.00	5 1/2
Tapioca	1 1/2	80	84	16.8	3.55	5 3/4
Taramis	1 5/8	91	97	19.4	4.15	6 1/4
Target	1 3/4	115	112	22.4	4.85	7 1/4
Tarnish	2	134	144	28.8	6.30	8
Tarpaulin	2 1/4	170	182	36.4	8.00	8 1/2
Tartao	2 1/2	210	222	45.0	9.85	9 1/2
Tarturo	2 3/4	255	266	53.0	11.95	10



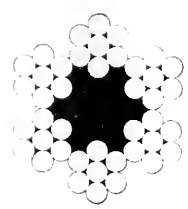
SPECIAL STEEL

(Trade mark registered)

Haulage Rope — Hemp Center

See Fig. 2, opposite page — See description page 10 — For quality, see page 13

Telegraph Name	Diameter in Inches	Price per Foot in Cents	Approximate Breaking Strain in Tons of 2,000 Pounds	Allowable Working Strain in Tons of 2,000 Pounds	Average Weight of Rope per Foot	Minimum Size of Drum or Sheaves in Feet
Tarsus	5/16	6	5.58	1.11	0.22	2
Tassel	3/8	7 1/4	7.50	1.50	0.30	2 1/4
Tawdry	7/16	9 1/2	9.70	1.94	0.39	2 1/2
Tawny	1/2	11 1/2	12.3	2.46	0.50	3
Teasel	9/16	14	15.1	3.02	0.62	3 1/2
Temper	5/8	20	21	4.20	0.89	4 1/2
Temporal	3/4	26	28	5.60	1.20	5
Temporize	1	34	37	7.40	1.58	5 3/4
Tenacity	1 1/8	44	46	9.20	2.00	6 1/4
Tenant	1 1/4	53	56	11.2	2.45	7 1/4



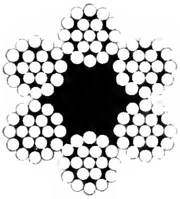
Patent Flattened Strand rope has 150 per cent more wearing surface than ordinary rope and [illegible] according to size.
When desired with a wire center, prices will be made on application.
We make to order special rope for special purposes with any combination of wires or styles of [illegible].
Our Special Steel wire rope, as its name implies, is made from a special grade of steel combining high tensile strength with flexibility and toughness. These, with many other properties, make it suitable for rough and heavy [illegible].
The satisfactory results obtained from the use of our Special Steel wire rope have warranted us in [illegible] mark to protect consumers against inferior grades.

Tell us what you want to use the rope for and we will suggest the proper rope for the purpose.

CRUCIBLE CAST STEEL

Hoisting Rope — Hemp Center

See Fig. 1, page 58 — See description page 10 — For quality, see page 5



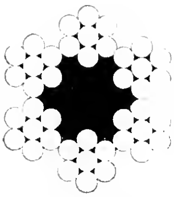
6 Strands
19 Wires
to the Strand

Telegraph Name	Diameter in Inches	Price per Foot in Cents	Approximate Breaking Strain in Tons of 2,000 Pounds	Allowable Working Strain in Tons of 2,000 Pounds	Average Weight of Rope per Foot	Minimum Size of Drums or Sheaves in Feet
Eschew	1/4	9	2.4	0.48	0.10	1/2
Escrow	5/16	9 1/4	3.4	0.68	0.15	[illegible]
Escola	3/8	9 1/2	5.0	1.00	0.22	1
Escape	7/16	10	6.8	1.36	0.30	1 1/4
Escort	1/2	11	8.8	1.76	0.39	1 1/2
Esloin	9/16	12	11.0	2.20	0.50	1 3/4
Esoter	5/8	14	13.6	2.72	0.62	2 1/4
Espied	3/4	18	19.4	3.88	0.89	3
Essay	7/8	23	26	5.20	1.20	3 1/2
Estate	1	30	34	6.80	1.58	4
Estop	1 1/8	38	42	8.40	2.00	4 1/2
Estray	1 1/4	46	50	10.0	2.45	5
Esclair	1 3/8	56	62	12.4	3.00	5 1/2
Espouse	1 1/2	66	72	14.4	3.55	5 3/4
Esquire	1 5/8	74	84	16.8	4.15	6 1/4
Estrude	1 3/4	93	96	19.2	4.85	7 1/4
Esther	2	111	124	24.8	6.30	8
Esture	2 1/4	142	156	31.2	8.00	8 1/2
Estwain	2 1/2	175	190	37.9	9.85	9 1/2
Estwold	2 3/4	210	228	45.6	11.95	10

CRUCIBLE CAST STEEL

Transmission and Haulage Rope — Hemp Center

See Fig. 2, page 58 — See description page 10 — For quality, see page 5



6 Strands
7 Wires
to the Strand

Telegraph Name	Diameter in Inches	Price per Foot in Cents	Approximate Breaking Strain in Tons of 2,000 Pounds	Allowable Working Strain in Tons of 2,000 Pounds	Average Weight of Rope per Foot	Minimum Size of Drums or Sheaves in Feet
Cede	9/32	4	2.8	0.56	0.12 1/2	1 1/2
Ceil	5/16	4 1/4	3.4	0.68	0.15	1 3/4
Cease	3/8	5 1/2	4.8	0.96	0.22	2
Cedarn	7/16	6 1/2	6.6	1.32	0.30	2 1/4
Celery	1/2	7 1/2	8.4	1.68	0.39	2 1/2
Celiac	9/16	9	10.6	2.12	0.50	3
Celard	5/8	11	13.2	2.64	0.62	3 1/2
Cement	11/16	13 1/2	15.8	3.16	0.75	4
Cenoby	3/4	16	18.6	3.72	0.89	4 1/2
Censor	7/8	22	24	4.80	1.20	5
Century	1	28	32	6.40	1.58	5 3/4
Cerate	1 1/8	36	40	8.00	2.00	6 1/4
Cession	1 1/4	43	48	9.60	2.45	7 1/4
Cestus	1 3/8	51	58	11.6	3.00	8
Certify	1 1/2	60	68	13.6	3.55	8 1/2

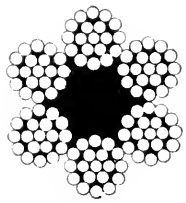
When desired with a wire center, prices will be made on application.
We can furnish special ropes for special purposes with any combination of wires or styles of twist or lay.
Tell us what you want to use the rope for and we will suggest the proper rope for the purpose.

PLOW STEEL ROPE

Hoisting Rope — Hemp Center

See Fig. 1, page 58 — See description page 10 — For quality, see page 13

Telegraph Name	Diameter in Inches	Price per Foot in Cents	Approximate Breaking Strain in Tons of 2,000 Pounds	Allowable Working Strain in Tons of 2,000 Pounds	Average Weight of Rope per Foot	Minimum Size of Drums or Sheaves in Feet
Pablas	1/4	12	3.00	.60	0.10	2 1/2
Pabledo	5/16	12 1/4	4.50	.90	0.15	2 1/2
Pablegar	3/8	12 1/2	6.55	1.31	0.22	1
Pableman	7/16	13	8.85	1.77	0.30	1 1/2
Parent	1/2	14	11.4	2.28	0.39	2 3/4
Pealing	9/16	19	18	3.60	0.62	3 1/2
Pleasant	5/8	26	25	5.00	0.89	4
Pigtail	3/4	34	34	6.80	1.20	4 1/2
Planter	1	43	44	8.80	1.58	5
Poets	1 1/8	52	56	11.2	2.00	6
Preaching	1 1/4	63	67	13.4	2.45	7
Pseudo	1 3/8	77	82	16.4	3.00	7 1/2
Pucker	1 1/2	93	96	19.2	3.55	8
Pyramid	1 3/4	135	128	25.6	4.85	9
Prospering	2	156	165	33.0	6.30	11
Puzzler	2 1/4	200	208	41.6	8.00	12



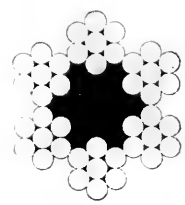
6 Strands
19 Wires
to the Strand

PLOW STEEL ROPE

Transmission and Standing Rope — Hemp Center

See Fig. 2, page 58 — See description page 10 — For quality, see page 13

Telegraph Name	Diameter in Inches	Price per Foot in Cents	Approximate Breaking Strain in Tons of 2,000 Pounds	Allowable Working Strain in Tons of 2,000 Pounds	Average Weight of Rope per Foot	Minimum Size of Drums or Sheaves in Feet
Rabat	1/2	11	11	2.20	0.39	3 3/4
Racket	5/8	14	14	2.80	0.50	4
Race	3/4	17	17	3.40	0.62	4 1/2
Radical	7/8	25	24	4.80	0.89	5 1/4
Rafter	1	32	32	6.40	1.20	6
Ragman	1 1/8	41	42	8.40	1.58	6 3/4
Rainbow	1 1/4	51	53	10.6	2.00	8
Rampart	1 1/4	61	64	12.8	2.45	9 1/4



6 Strands
7 Wires
to the Strand

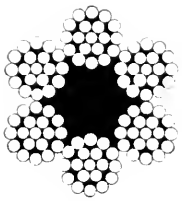
When desired with a wire center, prices will be made on application.
We make to order special ropes for special purposes with any combination of wires or styles of twist or lay.

Tell us what you want to use the rope for and we will suggest the proper rope for the purpose.

SWEDES IRON ROPE

Hoisting Rope — Hemp Center

See Page 58 — See Page 10 — For Quality, See Page 13

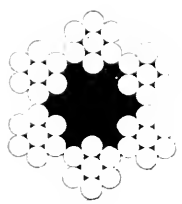


Trade Name	Diameter in Inches	Price per Foot in Cents	Approximate Breaking Strain in Tons of 2,000 Pounds	Allowable Working Strain in Tons of 2,000 Pounds	Average Weight of Rope per Foot	Minimum Size of Drums or Sheaves in Feet
Lover	1/4	6 1/2	1.2	0.24	0.10	3/4
Lopes	5/16	6 3/4	1.7	0.34	0.15	1
Load	3/8	7	2.5	0.50	0.22	1 1/2
Loaf	7/16	7 1/2	3.4	0.68	0.30	2
Loafer	1/2	8	4.4	0.88	0.39	2 1/4
Loam	9/16	10	5.5	1.10	0.50	2 3/4
Loath	5/8	12	6.8	1.36	0.62	3 1/2
Lovell	3/4	16	9.7	1.94	0.89	4
Lobby	7/8	20	13	2.60	1.20	4 1/2
Lobster	1	26	17	3.40	1.58	5 1/4
Lobule	1 1/8	33	21	4.20	2.00	6
Local	1 1/4	40	25	5.00	2.45	6 1/2
Locate	1 3/8	48	31	6.20	3.00	7
Lock	1 1/2	57	36	7.20	3.55	7 1/2
Locker	1 5/8	63	42	8.40	4.15	8 1/2
Locust	1 3/4	80	48	9.60	4.85	10
Lodger	2	92	62	12.40	6.30	12
Lofty	2 1/4	117	78	15.60	8.00	13

SWEDES IRON ROPE

Transmission and Standing Rope — Hemp Center

See Page 58 — See Page [illegible] — For Quality, See Page 13



Trade Name	Diameter in Inches	Price per Foot in Cents	Approximate Breaking Strain in Tons of 2,000 Pounds	Allowable Working Strain in Tons of 2,000 Pounds	Average Weight of Rope per Foot	Minimum Size of Drums or Sheaves in Feet
Subact	1/4	3 1/4	1.4	0.28	0.12 1/2	2 1/4
Subdeam	5/16	3 3/4	1.7	0.34	0.15	2 1/2
Subduce	3/8	4 1/2	2.4	0.48	0.22	2 3/4
Suberic	7/16	5 1/2	3.3	0.66	0.30	3 1/4
Subject	1/2	6 1/2	4.2	0.84	0.39	4
Sublap	9/16	8	5.3	1.06	0.50	4 1/2
Sublet	5/8	10	6.6	1.32	0.62	5 1/4
Sublime	3/4	12	7.9	1.58	0.75	6
Submit	7/8	14	9.3	1.86	0.89	6 3/4
Subnode	7/8	17 1/2	12	2.40	1.20	7 1/2
Subsign	1	23	16	3.20	1.58	8 1/2
Suborn	1 1/8	29	20	4.00	2.00	9 1/2
Subpena	1 1/4	36	24	4.80	2.45	10 1/4
Subrosa	1 3/8	43	29	5.80	3.00	12
Subsist	1 1/2	51	34	6.80	3.55	13

Tell us what you want to use the rope for and we will suggest the proper rope for the purpose.

SWEDES IRON WIRE TILLER ROPE

See Fig. 1, page 58 — See description page 14

For quality, see page 13

Telegraph Name	Diameter in Inches	Price per Foot in Cents	Average Weight per Foot
Obtuse	1/4	7 1/2	.07
Obelisk	5/16	8	.11
Object	3/8	9	.16
Obliging	7/16	10	.21
Obrogate	1/2	11	.28
Obose	9/16	14	.35
Obscure	5/8	17	.43
Obtained	3/4	22	.62
Obverting	7/8	27	.84
Obdurate	1	33	1.10

SASH CORDS

COPPER, IRON, TINNED AND GALVANIZED

Six Strands, Seven Wires to the Strand

Cotton Center

Diameter in Inches	Trade Number	Price per Foot in Cents			Weight per Foot in Pounds		Approximate Breaking Strain in Pounds		
		Iron	Tinned or Galvanized Iron	Copper	Iron	Copper	Iron		Bright Copper
							Bright	Annealed	
1/4	26	3	4	9	.100	.115	2,200	1,600	1,265
5/16	27	2 3/4	3 1/2	7 1/2	.076	.087	1,809	1,254	1,022
7/16	27 1/2	2 1/4	3	6	.056	.064	1,417	947	792
1/8	28	1 3/4	2 1/4	4 1/2	.025	.029	790	467	435
9/32	28 1/2	1 1/2	2	3 1/2	.014	.016	510	280	272
1/16	29	1 1/4	1 3/4	3	.006	.007	262	132	140

Annealed cords same price as bright cords

GALVANIZED WIRE STRAND

For Smoke Stack Guys, Electric Light Plants, Street Railways, Signal Cord, Fencing and Other Purposes

List of Dec. 19, 1906

Seven Steel Wires Twisted Into a Single Strand

See Fig. 5, page 58 — See description page 14

For quality, see page 14

Telegraph Name	Seven Wires No.	Approximate Diameter	Approximate Weight per 1000 Feet	Approximate Strength in Pounds	Price per 100 Feet
Union	8	1/2	510	8,500	$4.50
United	10	7/16	415	6,500	3.75
Unitarian	11	3/8	295	5,000	2.75
Universal	12	5/16	210	3,800	2.25
Unwary	14	1/4	125	2,300	1.75
Unio	16	3/32	95	1,800	1.50
Unicorn	17	1/8	75	1,400	1.25
Unsavory	18	3/32	55	900	1.15
Ukase	20	1/8	32	500	1.00
Ugly	21	9/32	20	400	.80

GALVANIZED MAST-ARM ROPE

For Electric Light Companies, etc.

Nine Strands, Four Wires to the Strand

Cotton Center

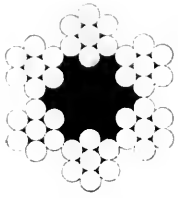
Price per Foot in Cents	Diameter in Inches	Weight per Foot in Pounds	Approximate Breaking Strain in Pounds
5	3/8	0.158	2,300
3 1/2	5/16	0.109	1,700
2 3/4	1/4	0.070	1,100

GALVANIZED IRON WIRE ROPE

For Ships' Rigging, Guys for Derricks, etc.

See Description on Page 14

For Prices see Page 14



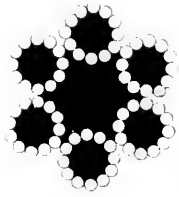
See Fig. 2, page 58
6 Strands
7 Wires
to the Strand

See Fig. 1, page 58
6 Strands
12 Wires
to the Strand

Approximate Diameter in Inches	Circumference in Inches	Estimated Weight per Foot Hemp Center	Seven Wires Coarse Laid — Telegraph Name	Seven Wires Coarse Laid — Price per Foot, Cents	Twelve Wires Fine Laid — Telegraph Name	Twelve Wires Fine Laid — Price per Foot, Cents	Circum. in Inches of New Manila Rope of Equal Strength	Breaking Strain in Tons of 2000 Pounds
2	6	6.00	Nabiani	....	Sabalos	....	12	50
1 3/4	5 1/2	4.85	Nabica	44	Sabanones	46	11	41
1 11/16	5 1/4	4.40	Nabidden	41	Sabaoth	43	10 1/2	40
1 5/8	5	4.00	Nabissi	38	Sabedor	40	10	36
1 1/2	4 3/4	3.60	Nablium	35	Sabelbek	37	9 1/2	32
1 3/8	4 1/2	3.25	Nabob	31	Sabelkling	33	9	29
1 5/16	4 1/4	2.90	Naboria	27	Sabelles	29	8 1/2	26
1 1/4	4	2.55	Naburiger	24	Sabellorum	25	8	23
1 1/16	3 3/4	2.25	Nacarada	21	Sabelpels	22	7 1/2	20
1	3 1/2	1.95	Nacareos	18	Sabenca	19	6 1/2	18
15/16	3 1/4	1.70	Nacelle	16	Saberetes	17	6	15
7/8	3	1.41	Nachbar	14	Sabicu	15	5 3/4	13
13/16	2 3/4	1.21	Nachbefehl	12	Sabinar	13	5 1/4	11
3/4	2 1/2	1.00	Nachdem	10	Sablablat	11 1/2	5	9
11/16	2 1/4	.81	Nachdruck	9	Sablasses	10	4 3/4	7.3
5/8	2	.64	Nachfolgen	8	Sableront	9	4 1/2	5.8
9/16	1 3/4	.49	Nachgaffen	7	Sableux	8	3 3/4	4.4
1/2	1 1/2	.36	Nachgeben	6	Saboga	7	3	3.2
7/16	1 1/4	.25	Nachgeholt	5	Saboleta	6	2 1/2	2.3
3/8	1 1/8	.20	Nachgluth	4	Sabord	5	2 1/4	1.8
5/16	1	.16	Nachguss	3 1/2	Saborgadas	4 1/2	2	1.4
5 strands, 7 wires each								
1/4	7/8	.123	Nachjagen	3	Saborgo		1 1/4	1.1
3/16	3/4	.090	Nachklang	2 1/2	Sabotable		1 1/2	0.81
1/8	5/8	.063	Nachkost	2 1/4	Sabouleux		1 1/4	0.56
1/16	1/2	.040	Nachlaufen	2	Sabres		1 1/8	0.36

Galvanized wire rope is less than hemp rope of equal strength, will last ten times as long, does not stretch or shrink with changes of weather, and is less bulky and weighs less than hemp rope of equal strength. It is not advisable to use galvanized rope to run over drums and sheaves.

GALVANIZED IRON AND CAST-STEEL RUNNING ROPE



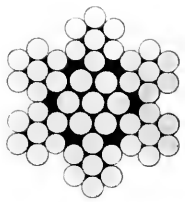
Six Strands and a Hemp Core, Each Strand Consisting of Twelve Wires

Hemp Center

Price per Foot in Cents		Approximate Diameter in Inches	Circumference in Inches	Weight per Foot in Pounds	Approximate Breaking Strain in Tons of 2,000 Pounds	
Iron	Cast-Steel				Iron	Cast-Steel
22	30	1 1/16	3 1/4	1.14	12.0	24.0
20	27	1	3	0.97	10.7	21.5
17	23	7/8	2 3/4	0.81	8.21	16.4
14 1/2	19	13/16	2 1/2	0.67	7.20	14.4
11 1/2	15	3/4	2 1/4	0.54	6.13	12.3
9	12	5/8	2	0.43	4.29	8.58
8	10	9/16	1 3/4	0.33	3.47	6.94
7	9	1/2	1 1/2	0.24	2.78	5.56
6 1/2	8 1/2	7/16	1 1/4	0.17	2.15	4.30
6	7 3/4	3/8	1 1/8	0.14	1.75	3.50
5 1/2	7	5/16	1	0.11	1.14	2.28

Galvanized flexible running rope is similar in construction to galvanized hawsers. It is composed of six strands built around a hemp core, each strand being made of twelve wires and a hemp center. It is quite as flexible as manila running rope, much stronger and more durable. This running rope finds much favor aboard ship, and is coming more and more into use. It is made of either iron or steel as desired.

GALVANIZED STEEL CABLES



For Suspension Bridges

Six Strands of Seven Wires Each

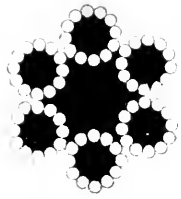
Wire Center

Price per Foot in Cents	Diameter in Inches	Approximate Circumference in Inches	Weight in Pounds per Foot	Approximate Breaking Strain in Tons of 2,000 Pounds
	2 3/4	8 5/8	12.7	310
	2 5/8	8 1/4	11.6	283
	2 1/2	7 7/8	10.5	256
	2 3/8	7 1/2	9.50	232
	2 1/4	7 1/8	8.52	208
	2 1/8	6 5/8	7.60	185
	2	6 1/4	6.73	164
	1 7/8	5 7/8	5.90	144
	1 3/4	5 1/2	5.10	124
	1 5/8	5	4.34	106
	1 1/2	4 3/4	3.70	90
	1 3/8	4 1/4	3.10	75
	1 1/4	4	2.57	62

Suspension bridges are becoming more popular, and deservedly so. They look neater and can be built quicker and cheaper than any other style of construction. As to strength, where the safety of the whole bridge often depends on the strength of a single piece of steel or iron, they are superior, because the cables are made of a large number of wires formed into a whole, so that it is impossible to get a weak spot in a cable.

GALVANIZED STEEL HAWSERS

Six Strands and a Hemp Center, each Strand



consisting of Twelve Wires and a Hemp Core

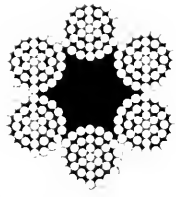
Approximate Diameter in Inches	Circumference in Inches	Price per Foot in Cents	Weight per Foot in Pounds	Approximate Breaking Strength in Tons of 2000 Pounds	Approximate Safe New Manila Hawser of Equal Strength
1 1/4	5 1/2	56	3.25	64	13 1/2
1 1/16	5 1/4	53	2.95	57	13
1 3/8	5	48	2.70	53	12 1/2
1 1/2	4 3/4	44	2.42	45	12
1 5/16	4 1/2	41	2.18	42	11 1/2
1 3/8	4 1/4	37	1.94	39	11
1 1/4	4	34	1.72	32	10
1 3/16	3 3/4	30	1.51	29	9 1/4
1 1/8	3 1/2	27	1.32	27	8 3/4
1 1/16	3 1/4	25	1.14	24	8 1/2
1	3	21	0.97	21.5	8
7/8	2 3/4	19	0.81	16.4	6 1/2
13/16	2 1/2	16	0.67	14.4	6

These hawsers are much stronger than manila hawsers of equal size, weigh less, are not nearly so bulky nor hard to handle. They are fully as pliable, resist wear much better, and are safer and more reliable. They are used extensively for towing on both the great lakes and the oceans. As a rule, automatic winches are used in connection with them, maintaining a nearly uniform tension, giving and taking in a seaway, with the pitching and rolling of the barge or towing steamer. These hawsers are constructed with a hemp core, around which are twisted six strands, each of which is composed of twelve wires wound around a hemp center.

They are made of the best grade of cast steel, treated by our double galvanizing process, and are satisfactory and durable.

GALVANIZED STEEL HAWSERS

Six Strands and a Hemp Center, each Strand



consisting of Thirty-seven Wires and a Hemp Core

Approximate Diameter in Inches	Circumference in Inches	Price per Foot in Cents	Weight per Foot in Pounds	Approximate Breaking Strength in Tons of 2000 Pounds	
				Special	Cast Steel
2	6 1/4	120	6.25	128	166
1 3/4	5 1/2	98	4.85	101	131
1 5/8	5	84	4.00	84	109
1 1/2	4 3/4	77	3.60	76	99
1 3/8	4 1/4	65	2.90	62	81
1 1/4	4	60	2.55	55	72
1 1/8	3 1/2	48	1.95	42	55
1	3	37	1.44	31	40

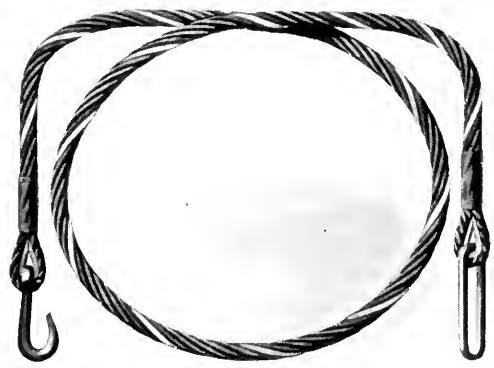
These hawsers combine great strength with flexibility. The demand for towing a number of heavily loaded barges, practically in all kinds of weather, has called for a wire hawser stronger than any manila hawser made. The two grades presented in the opposite table—Cast-steel and Special—are well fitted for the most exacting conditions. These are particular kinds of high grade steel, which have been developed by this company, and may be relied on to give satisfaction.

We make to order special ropes for special purposes by any combination of wires or styles of twist or lay.

Tell us what you want to use the rope for and we will suggest the proper rope for the purpose.

"HERCULES" SWITCH ROPES 6 x 19

(Trade mark registered)

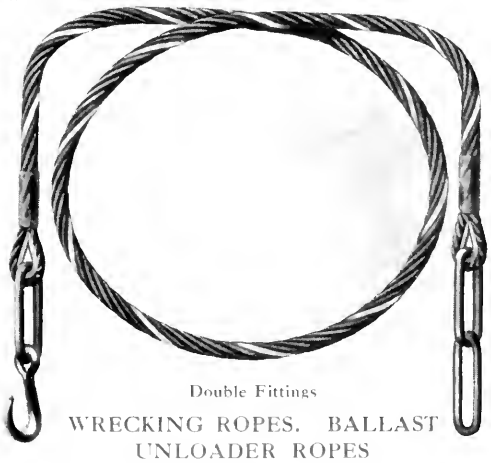


Single Fittings

WRECKING ROPES. BALLAST UNLOADER ROPES

Hook and Thimble in One End, Thimble and Link in Other End

Breaking Strain in Tons of 2,000 Pounds	113	96	76	60	50	36	29
Length in Feet	Diameter in Inches						
	1½	1	1¼	1⅛	1	⅞	¾
20	39.05	31.25	24.30	21.00	16.80	14.55	10.00
25	44.50	35.75	27.88	23.88	19.25	16.50	11.50
30	49.95	40.25	31.45	26.75	21.70	18.45	13.00
35	55.40	44.75	35.03	29.63	24.15	20.40	14.50
40	60.85	49.25	38.60	32.50	26.60	22.35	16.00
45	66.30	53.75	42.18	35.38	29.05	24.30	17.50
50	71.75	58.25	45.75	38.25	31.50	26.25	19.00



Double Fittings

WRECKING ROPES. BALLAST UNLOADER ROPES

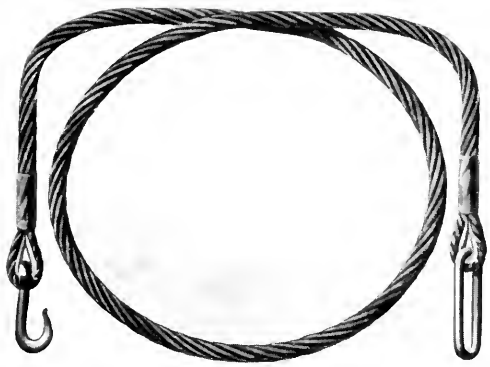
Hook, Link and Thimble in One End, Thimble and Two Links in Other End

Breaking Strain in Tons of 2,000 Pounds	113	96	76	60	50	36	29
Length in Feet	Diameter in Inches						
	1½	1⅜	1¼	1⅛	1	⅞	¾
20	43.05	34.75	27.30	23.50	18.80	16.30	11.50
25	48.50	39.25	30.88	26.38	21.25	18.25	13.00
30	53.95	43.75	34.45	29.25	23.70	20.20	14.50
35	59.40	48.25	38.03	32.13	26.15	22.15	16.00
40	64.85	52.75	41.60	35.00	28.60	24.10	17.50
45	70.30	57.25	45.18	37.88	31.05	26.05	19.00
50	75.75	61.75	48.75	40.75	33.50	28.00	20.50

We make our own Switch Rope Fittings

"SPECIAL STEEL" SWITCH ROPES 6 x 19

(Trade mark registered)



Single Fittings

Hook and Thimble in One End, Thimble and Link in Other End

Breaking Strain in Tons of 2,000 Pounds	84	72	58	49	39	30	22
Length in Feet	Diameter in Inches						
	1½	1⅜	1¼	1⅛	1	⅞	¾
20	33.25	26.65	21.00	18.50	14.20	12.35	8.40
25	37.25	30.00	23.75	20.75	16.00	13.75	9.50
30	41.25	33.35	26.50	23.00	17.80	15.15	10.60
35	45.25	36.70	29.25	25.25	19.60	16.55	11.70
40	49.25	40.05	32.00	27.50	21.40	17.95	12.80
45	53.25	43.40	34.75	29.75	23.20	19.35	13.90
50	57.25	46.75	37.50	32.00	25.00	20.75	15.00

Hook, Link and Thimble in One End, Thimble and Two Links in Other End

20	37.25	30.15	24.00	21.00	16.20	14.10	9.90
25	41.25	33.50	26.75	23.25	18.00	15.50	11.00
30	45.25	36.85	29.50	25.50	19.80	16.90	12.10
35	49.25	40.20	32.25	27.75	21.60	18.30	13.20
40	53.25	43.55	35.00	30.00	23.40	19.70	14.30
45	57.25	46.90	37.75	32.25	25.20	21.10	15.40
50	61.25	50.25	40.50	34.50	27.00	22.50	16.50

We make Ropes of any desired combination of Hooks, Links and Sockets

PLOUGH STEEL SWITCH ROPES 6 x 19

Single Fittings

Hook and Thimble in One End, Thimble and Link in Other End

Breaking Strain in Tons of 2,000 Pounds	96	82	67	56	44	34	25
Length in Feet	Diameter in Inches						
	1½	1	1¼	1	¾	½	⅜
20	35.85	28.65	22.60	19.90	15.60	13.55	9.20
25	40.50	32.50	25.75	22.50	17.75	15.25	10.50
30	45.15	36.35	28.90	25.10	19.90	16.95	11.80
35	49.80	40.20	32.05	27.70	22.05	18.65	13.10
40	54.45	44.05	35.20	30.30	24.20	20.35	14.40
45	59.10	47.90	38.35	32.90	26.35	22.05	15.70
50	63.75	51.75	41.50	35.50	28.50	23.75	17.00

Hook, Link and Thimble in One End, Thimble and Two Links in Other End

20	39.85	32.15	25.60	22.40	17.60	15.30	10.70
25	44.50	36.00	28.75	25.00	19.75	17.00	12.00
30	49.15	39.85	31.90	27.60	21.90	18.70	13.30
35	53.80	43.70	35.05	30.20	24.05	20.40	14.60
40	58.45	47.55	38.20	32.80	26.20	22.10	15.90
45	63.10	51.40	41.35	35.40	28.35	23.80	17.20
50	67.75	55.25	44.50	38.00	30.50	25.50	18.50

We make all our Switch Rope Fittings

CRUCIBLE STEEL SWITCH ROPES 6 x 19

Single Fittings

Hook and Thimble in One End, Thimble and Link in Other End

Breaking Strain in Tons of 2,000 Pounds	72	62	50	42	31	26	19⅜
Length in Feet	Diameter in Inches						
	1½	1	1¼	1	¾	½	⅜
20	30.45	24.45	19.20	17.10	13.00	11.35	7.60
25	33.75	27.25	21.50	19.00	14.50	12.50	8.50
30	37.05	30.05	23.80	20.90	16.00	13.65	9.40
35	40.35	32.85	26.10	22.80	17.50	14.80	10.30
40	43.65	35.65	28.40	24.70	19.00	15.95	11.20
45	46.95	38.45	30.70	26.60	20.50	17.10	12.10
50	50.25	41.25	33.00	28.50	22.00	18.25	13.00

Hook, Link and Thimble in One End, Thimble and Two Links in Other End

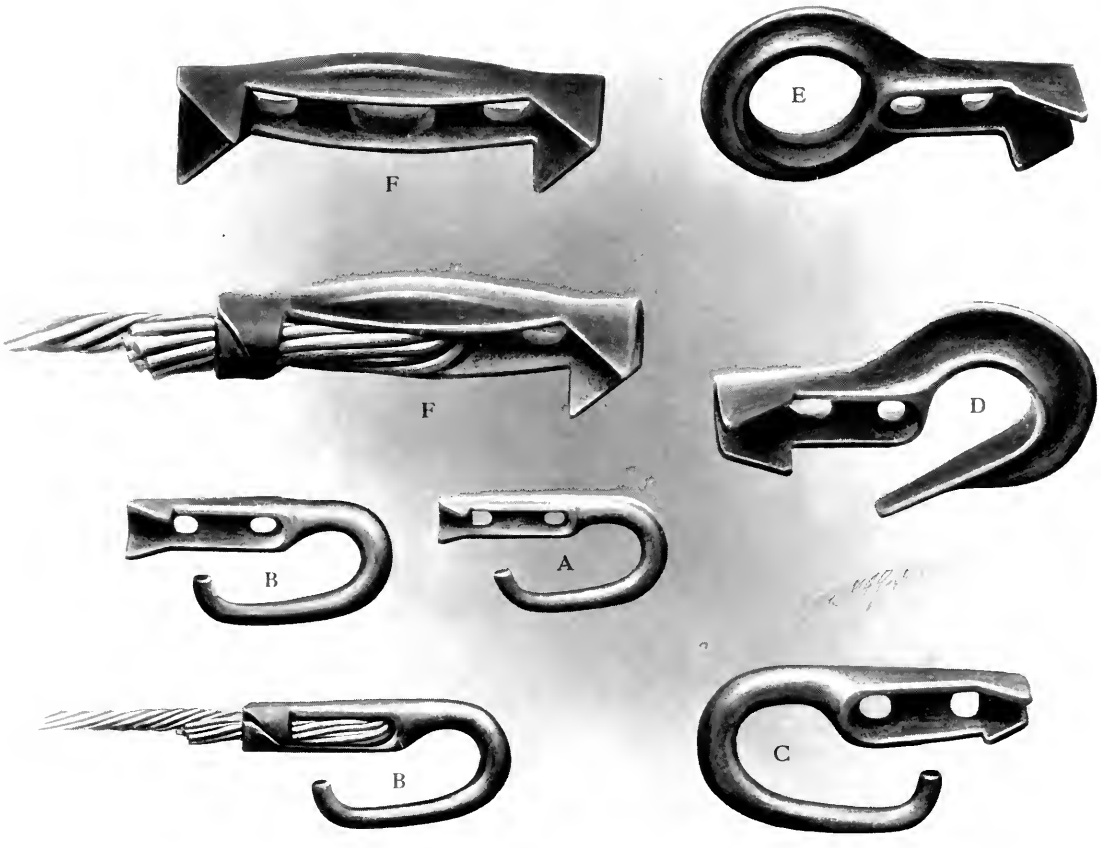
20	34.45	27.95	22.20	19.60	15.00	13.10	9.10
25	37.75	30.75	24.50	21.50	16.50	14.25	10.00
30	41.05	33.55	26.80	23.40	18.00	15.40	10.90
35	44.35	36.35	29.10	25.30	19.50	16.55	11.80
40	47.65	39.15	31.40	27.20	21.00	17.70	12.70
45	50.95	41.95	33.70	29.10	22.50	18.85	13.60
50	54.25	44.75	36.00	31.00	24.00	20.00	14.50

Fittings spliced in single: 1" inch, $32.00; 2 inch, $36.00. Double, 1" inch, $38.00; 2 inch, $43.00.

We make Ropes of any desired combination of Hooks, Links and Sockets

PATENT WIRE ROPE HOOKS, RINGS AND COUPLINGS

These fittings are made of malleable iron, and can be bent cold. The cheapest and simplest fastenings for galvanized strand and iron wire ropes



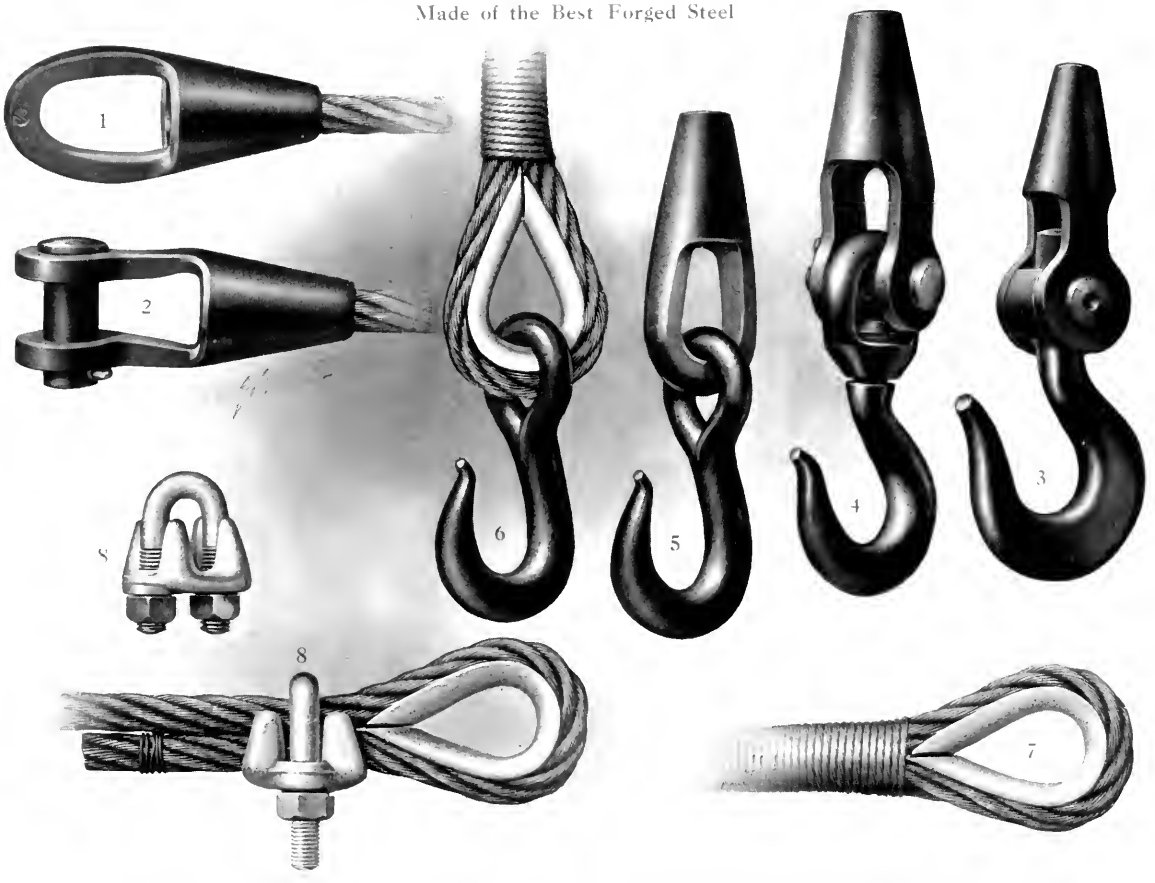
Hooks indicated by Figs. A, B and C are for ⅝-inch and smaller. Fig. D for ¾-inch and larger. Ring, Fig. E, and Coupling, Fig. F, are in all sizes from ¼ to 1¼-inch inclusive

HOOKS, RINGS AND COUPLINGS

Size of Rope	Price, Each	Size of Rope	Price, Each
No. 0	⅛	$0.05	No. 5	⅝	$0.25
No. 1	3/16	.07	No. 6	½	.28
No. 2	¼	.08	No. 7	7/16	.38
No. 3	5/16	.15	No. 8	⅜	.66
No. 4	⅜	.20			

WIRE ROPE FASTENINGS

Made of the Best Forged Steel



CLOSED SOCKETS (1)

Diameter of Rope or Inches	Circumference of Rope in Inches	Iron or Steel Rope	
		Loose	Fastened
2 1/4	7 1/8		
2	6 1/4		
1 3/4	5 1/2		
1 5/8	5		
1 1/2	4 3/4	$6.80	$11.80
1 3/8	4 1/4	6.00	10.25
1 1/4	4	4.50	8.00
1 1/8	3 1/2	3.30	6.15
1	3	2.40	4.65
7/8	2 3/4	1.85	3.85
3/4	2 1/4	1.65	3.15
5/8	2	1.35	2.65
9/16	1 3/4	1.10	2.35
1/2	1 1/2	1.10	2.25
7/16	1 1/4	.85	2.00
3/8	1 1/8	.85	1.85
5/16	1	.70	1.60
1/4	3/4	.70	1.60

OPEN SOCKETS (2)

Diameter of Rope in Inches	Circumference of Rope in Inches	Iron or Steel Rope	
		Loose	Fastened
2 1/4	7 1/8		
2	6 1/4		
1 3/4	5 1/2		
1 5/8	5		
1 1/2	4 3/4		
1 3/8	4 1/4		
1 1/4	4	$6.10	$9.60
1 1/8	3 1/2	4.50	7.35
1	3	3.15	5.40
7/8	2 3/4	2.50	4.50
3/4	2 1/4	2.10	3.60
5/8	2	1.65	2.95
9/16	1 3/4	1.35	2.60
1/2	1 1/2	1.35	2.50
7/16	1 1/4	1.00	2.15
3/8	1 1/8	1.00	2.00
5/16	1	.85	1.75
1/4	3/4	.85	1.75

WIRE ROPE FASTENINGS—*Continued*

Made of the Best Forged Steel

HERCULES SWIVEL HOOK AND SOCKET (3)

With Double Swivel

Diameter of Rope in Inches	Circum. of Rope in Inches	For Iron and Cast-Steel Rope	
		Loose	Fastened
1 1/8	3 1/2	$18.00	$20.85
1	3	11.40	13.65
7/8	2 3/4	9.50	11.50
3/4	2 1/4	8.00	9.50
5/8	2	7.20	8.50
9/16	1 3/4	6.60	7.85
1/2	1 1/2	6.00	7.15
7/16	1 1/4	5.35	6.45
3/8	1 1/8	4.70	5.70

SWIVEL HOOK AND SOCKET (4)

Diam. of Rope in Inches	Circum. of Rope in Inches	For Steel Rope		For Iron Rope	
		Loose	Fasten'd	Loose	Fasten'd
1 1/2	4 3/4				
1 3/8	4 1/4				
1 1/4	4	$17.00	$20.50	$13.50	$17.00
1 1/8	3 1/2	12.00	14.85	9.00	11.85
1	3	8.35	10.60	5.70	7.95
7/8	2 3/4	7.00	9.00	4.75	6.75
3/4	2 1/4	5.25	6.75	4.00	5.50
5/8	2	4.60	5.90	3.60	4.90
9/16	1 3/4	3.75	5.00	3.00	4.25
1/2	1 1/2	3.55	4.70	3.00	4.15
7/16	1 1/4	2.85	4.00	2.55	3.70
3/8	1 1/8	2.70	3.70	2.35	3.35
5/16	1	2.30	3.20	2.00	2.90
1/4	3/4	2.30	3.20	2.00	2.90

HOOK AND SOCKET (5)

Diam. of Rope in Inches	Circum. of Rope in Inches	For Steel Rope		For Iron Rope	
		Loose	Fasten'd	Loose	Fasten'd
1 1/2	4 3/4				
1 3/8	4 1/4				
1 1/4	4	$10.00	$13.50	$8.00	$11.50
1 1/8	3 1/2	8.25	11.10	6.25	9.10
1	3	6.50	8.75	4.60	6.85
7/8	2 3/4	5.25	7.25	3.70	5.70
3/4	2 1/4	3.85	5.35	3.00	4.50
5/8	2	2.90	4.20	2.30	3.60
9/16	1 3/4	2.45	3.70	2.00	3.25
1/2	1 1/2	2.10	3.25	1.95	3.10
7/16	1 1/4	1.70	2.85	1.55	2.70
3/8	1 1/8	1.65	2.65	1.50	2.50
5/16	1	1.45	2.35	1.25	2.15
1/4	3/4	1.45	2.35	1.25	2.15

HOOK AND THIMBLE (6)

Diameter of Rope in Inches	For Steel Rope		For Iron Rope	
	Loose	Fastened	Loose	Fastened
1 1/2	$7.00	$13.50	$5.00	$11.00
1 3/8	5.40	11.15	3.40	8.65
1 1/4	4.60	9.20	2.65	6.90
1 1/8	4.40	8.15	2.40	5.90
1	3.75	6.70	1.90	4.65
7/8	2.90	5.35	1.40	3.70
3/4	1.85	3.75	1.10	2.85
5/8	1.40	2.85	.85	2.20
9/16	1.10	2.40	.75	1.95
1/2	.80	2.05	.65	1.80
7/16	.75	1.95	.60	1.70
3/8	.70	1.85	.55	1.60
5/16	.65	1.75	.50	1.50
1/4	.65	1.75	.50	1.50

THIMBLE SPLICED ON ROPE (7)

Diam. of Rope in Inches	For Steel Rope	For Iron Rope	Diam. of Rope in Inches	For Steel Rope	For Iron Rope
1 1/2	$6.50	$6.00	5/8	$1.55	$1.45
1 3/8	5.75	5.25	9/16	1.30	1.20
1 1/4	4.70	4.35	1/2	1.25	1.15
1 1/8	3.90	3.65	7/16	1.20	1.10
1	3.00	2.85	3/8	1.15	1.05
7/8	2.55	2.40	5/16	1.10	1.00
3/4	2.00	1.85	1/4	1.10	1.00

THE "CROSBY" WIRE ROPE CLIP (8)

Diameter of Rope	Price Each
1/4 inch	$0.25
5/16 inch	.25
3/8 inch	.25
1/2 inch	.30
5/8 inch	.35
3/4 inch	.40
7/8 inch	.45
1 inch	.50
1 1/8 inch	.50
1 1/4 inch	.50
1 3/8 inch	.55
1 1/2 inch	.60
1 3/4 inch	3.50
2 inch	4.00
2 1/4 inch	5.00
2 1/2 inch	6.00

WIRE ROPE FASTENINGS — *Continued*

SISTER HOOK AND THIMBLE (1)

Diameter of Rope in Inches	For Steel Rope		For Iron Rope	
	Loose	Fastened	Loose	Fastened
1 1/2	$7.00	$13.50	$5.00	$11.00
1 3/8	5.40	11.15	3.40	8.65
1 1/4	4.60	9.20	2.65	6.90
1 1/8	4.40	8.15	2.40	5.90
1	3.75	6.70	1.90	4.65
7/8	2.90	5.35	1.40	3.70
3/4	1.85	3.75	1.10	2.85
5/8	1.40	2.85	.85	2.20
9/16	1.10	2.40	.75	1.95
1/2	.80	2.05	.65	1.80
7/16	.75	1.95	.60	1.70
3/8	.70	1.85	.55	1.60
5/16	.65	1.75	.50	1.50
1/4	.65	1.75	.50	1.50

EXTRA HEAVY OVAL WIRE ROPE THIMBLES (2)

Galvanized

Diameter of Rope	Price Each	Diameter of Rope	Price Each
1/4 inch	$0.08	3/4 inch	$0.15
5/16 inch	.08	7/8 inch	.16
3/8 inch	.09	1 inch	.20
7/16 inch	.10	1 1/8 inch	.28
1/2 inch	.11	1 1/4 inch	.33
9/16 inch	.12	1 3/8 inch	.42
5/8 inch	.13	1 1/2 inch	.50

IRON GUY SHACKLES (3)

Diameter	Price Each	Diameter	Price Each
3/4 inch	$0.60	1 1/8 inch	$1.30
7/8 inch	.70	1 1/4 inch	1.90
1 inch	1.00		

THE "ATLAS" WIRE ROPE CLIP

(4)

Diameter of Rope	Price Each	Diameter of Rope	Price Each
1/4 inch	$0.25	7/8 inch	$0.45
5/16 inch	.25	1 inch	.50
3/8 inch	.25	1 1/8 inch	.60
1/2 inch	.30	1 1/4 inch	.65
5/8 inch	.35	1 1/2 inch	.75
3/4 inch	.40		

CAST WIRE ROPE CLAMPS

(5)

Leschen's Extra Heavy

Diameter of Rope	Price Each	Diameter of Rope	Price Each
3/8 inch	$0.45	1 1/4 inch	$2.50
1/2 inch	.60	1 1/2 inch	3.80
5/8 inch	.90	1 3/4 inch	5.50
3/4 inch	1.05	2 inch	8.50
7/8 inch	1.30	2 1/4 inch	13.75
1 inch	1.75	2 1/2 inch	15.00
1 1/8 inch	1.90	2 3/4 inch	16.50

Extra heavy clamps for bridge cables, cableways, etc. Prices furnished on request.

"KEYSTONE" SAFETY SHACKLE HOOK

(6) Quick Acting (7) Close Fitting

Size	For Wire Rope	Price
1 inch	5/8 inch to 3/4 inch	$3.00
1 3/8 inch	7/8 inch to 1 1/8 inch	5.00
1 5/8 inch	1 1/8 inch to 1 3/8 inch	7.50

Absolutely safe. Saves life. Saves property. Cannot become detached or pulled out. Suitable for use with wire rope, chains or tackle blocks.

WROUGHT-IRON TURNBUCKLES

(8)

With Hook and Eye. Painted Black

Diameter of Thread, Inches	Length of Thread Inches	Price
3/16	3 1/2	$0.80
1/4	3 3/4	.85
5/16	4	.90
3/8	4 3/4	1.10
7/16	5 1/4	1.25
1/2	6	1.55
5/8	7 1/2	2.00
3/4	9 1/4	2.75
7/8	11	3.50
1	12 1/4	4.25
1 1/8	13 1/2	5.25
1 1/4	14 1/2	6.25
1 3/8	15 1/2	7.50
1 1/2	16	9.00

CHAIN

(9)

Self-colored or Black

Size of Iron Inches	Links per Foot	Average Weight per 100 Feet Pounds	Average Breaking Strain of B. B. M. Pounds	Refined Iron Price Per Pound	Norway Iron Price Per Pound
3/16	15	45	1,731		
1/4	13	75	3,069		
5/16	12	120	4,794		
3/8	11	150	6,922		
7/16	9	200	9,408		
1/2	8	225	12,320		
9/16	7	320	15,590		
5/8	6	400	19,219		
3/4	5 1/2	590	27,687		
7/8	5	790	37,632		
1	5	1,000	49,280		
1 1/8	3 1/2	1,220	59,226		
1 1/4	3	1,500	73,114		

SPECIAL SOCKETS FOR BRIDGE CABLES AND CABLEWAY ROPES

(10) Closed Socket (11) Open Socket

Prices furnished promptly upon request.

SHEAVES FOR WIRE ROPE

WEBB PATTERN (1)

Diameter in Inches	Thickness in Inches	Hole for Pin in Inches	Plain Bore	Self-Lubricating Phosphor Bronze Bushed	Diameter in Inches	Thickness in Inches	Hole for Pin in Inches	Plain Bore	Self-Lubricating Phosphor Bronze Bushed
6	..	¾	$1.00	$2.50	14	....	....	$2.50	$4.50
8	....	....	1.25	3.00	16	...	..	3.00	5.00
10	.	....	1.60	3.50	18	....	..	4.00	6.00
12	.	....	2.00	4.00					

HEAVY PATTERN (2)

Diameter Bottom of Groove	Ext. Outside Diameter	Thickness in Inches	Hole for Pin in Inches	Plain Bore	Self-Lubricating Phosphor Bronze Bushed
12	15½	....	1	$3.00	$4.50
14	17½	...	1	4.00	5.50
16	19½	...	1	5.00	6.50

HEAVY HOISTING SHEAVES

(3)

Turned Grooves Bored to Fit Shaft

Diameter	Price Each
1½ feet	$12.00
2 feet	15.00
2½ feet	20.00
3 feet	26.00
3½ feet	30.00
4 feet	34.00
4½ feet	42.00
5 feet	50.00
6 feet	....
7 feet	....
8 feet	....

Shafting and boxes furnished at moderate prices

We are prepared on short notice to make to order the patterns and castings for any special sizes or styles not enumerated in the above list.

RUBBER SHEAVE FILLING

On ordering sheave filling, send exact diagram of size for filling wanted, or else send a small sectional end of the filling.

Illustration, Fig. 6

TRANSMISSION SHEAVES

(4)

For Transmission of Power by Wire Rope

Wheels Bored to Fit Shaft, Set-screwed or Key-seated. Balanced and Painted, Grooves Lined with Hard Rubber

Diameter in Feet	Price	Diameter in Feet	Price
1½	$12.00	5	$50.00
2	15.00	6	....
2½	20.00	7	....
3	26.00	8	....
3½	30.00	9	....
4	34.00	10	....
4½	42.00	12	....

9, 10 and 12 feet are made in halves.

These wheels are well balanced, as the centrifugal force is great. They should be fitted true on the shaft, and the shaft set at right angles to the line of transmission. If the wheels wabble and run out of line it will cause the rope to vibrate and jerk.

SELF-LUBRICATING PHOSPHOR BRONZE BUSHING

FOR WIRE ROPE SHEAVES

The bronze and graphite surfaces wear evenly, no refilling of graphite being necessary.

The bronze surface and shaft become filled with minute particles of graphite and thus become smooth at the surfaces, and the continuous revolving against the graphite maintains this smoothness, to which is added the high polish which graphite imparts.

These bushings can be run at the highest rate of speed *without the use of any oil*, graphite being a dry lubricant.

These bushings have been in use for over fifteen years, doing the most severe work, and cannot be equalled by any bushing that has been offered to the public, and the constant, increasing demand for these bushings speaks better than words.

They will soon save their cost in oil and trouble, and when worn can be taken out and a new one put in its place, *thus saving the cost of a new sheave.*

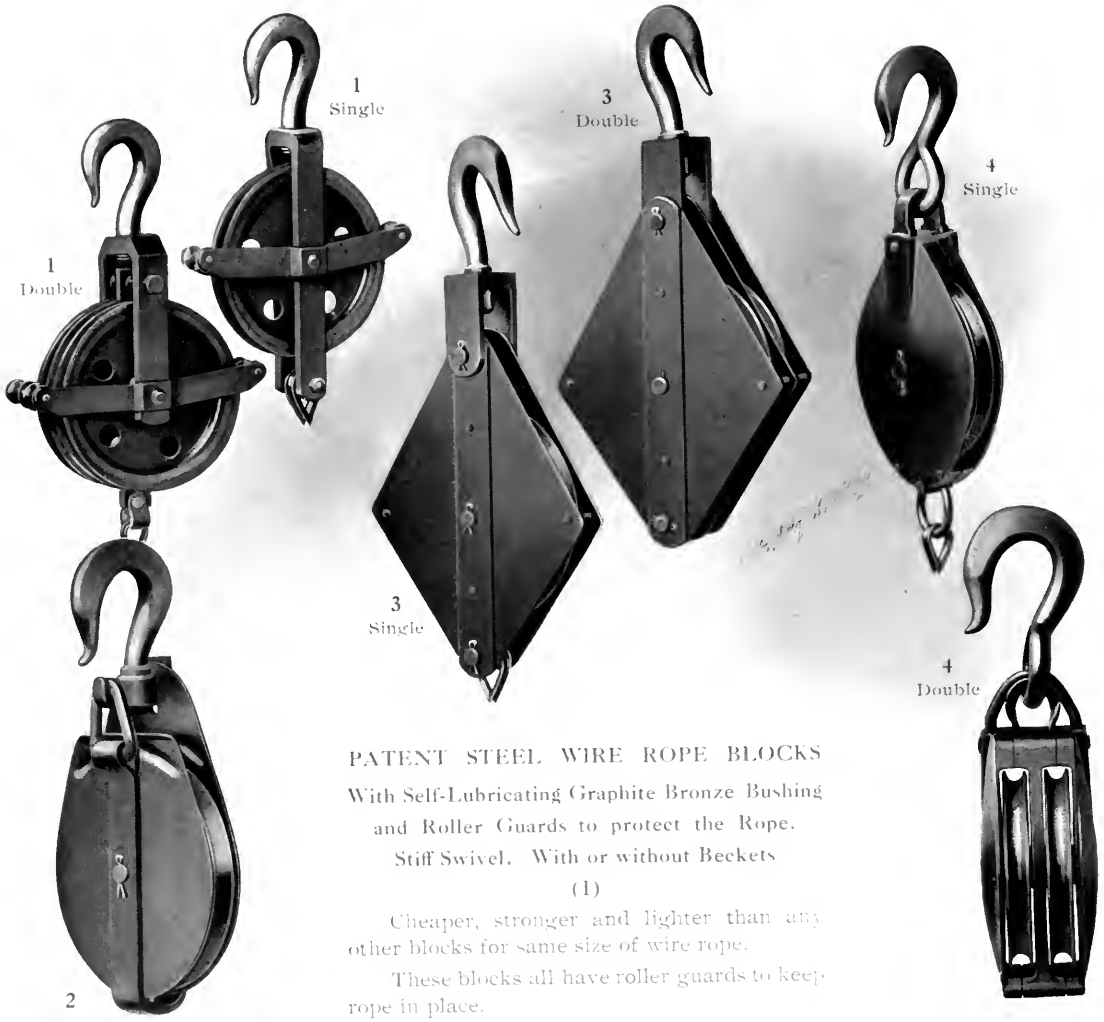
We carry in stock phosphor bronze bushings for 1-inch and 1¼-inch pins, but can furnish other sizes at short notice.

Send us a trial order. You will be pleased with our bushings and use no other after a careful trial.

In illustration, Fig. 5, the light shading shows the bronze casting; the dark spots show the graphite composition.

Prices on application.

PATENT STEEL BLOCKS FOR WIRE ROPE



PATENT STEEL WIRE ROPE BLOCKS

With Self-Lubricating Graphite Bronze Bushing and Roller Guards to protect the Rope. Stiff Swivel. With or without Beckets

(1)

Cheaper, stronger and lighter than any other blocks for same size of wire rope.

These blocks all have roller guards to keep rope in place.

We make to order triple blocks of any size.

Diameter of Sheave	Diameter of Rope	Single		Double		Diameter of Sheave	Diameter of Rope	Single		Double	
		Price	Trade No.	Price	Trade No.			Price	Trade No.	Price	Trade No.
10 inches	$\frac{3}{8}$ inch	$11.00	73	$18.00	75	16 inches	$\frac{3}{4}$ inch	$18.00	85	$27.00	87
12 "	$\frac{1}{2}$ "	12.50	77	20.00	79	18 "	$\frac{7}{8}$ "	23.00	89	32.00	91
14 "	$\frac{5}{8}$ "	15.00	81	23.00	83	20 "	1 "	28.00	93	38.00	95

LOCK SNATCH BLOCKS FOR WIRE ROPE (2)

With Self-Lubricating Graphite Bronze Bushings

Diameter of Sheave	Diameter of Rope	Self-Lubricating Phos. Bronze Bushed	
		Price	Trade No.
10 inches	1/2 inch	$18.00	213
12 "	5/8 "	21.00	215
14 "	3/4 "	24.00	217
16 "	7/8 "	30.00	219
18 "	1 "	40.00	221
20 "	1 1/8 "	52.00	223

The rope is perfectly protected by the STEEL SHELL, which is thoroughly japanned, making a handsome as well as a strong and durable block.

Note that the STRAP GOES ENTIRELY AROUND THE SHELL, giving the block the maximum of strength.

The increasing use of wire rope is causing quite a demand for the above blocks, as they are unequaled.

EXTRA HEAVY WROUGHT STEEL WIRE ROPE BLOCKS (3)

Single and Double Blocks have Hooks, Triple has Shackle

Size of Sheave		Self-Lubricating Phosphor Bronze Bushed		
Diam. at Bottom of Groove	Outside Diameter	Single	Double	Triple
12	15	$20.00	$27.00	$37.00
14	17	22.00	29.00	39.00
16	19	32.00	39.00	49.00

We make this block also with quadruple sheaves and shackle when required.

We call special attention to the hooks and shackles in this block. They are drop forged of a special make of mild steel, much superior to cast steel or Norway iron. They are absolutely the best on the market to-day.

The hooks are interchangeable one with another, and between single and double blocks. They can be quickly and easily removed from the blocks by simply drawing out a spring cotter. Another feature not to be lost sight of is that the hooks which are strong and tough are swivel hooks and *swing* on a heavy steel pin, a decided advantage over rigid fastenings.

All pins are made of *steel*. The sides are also made of mild steel, and cover the entire sheave, protecting it from chipping or breaking. In fact, the entire block is made of steel, except the cast iron sheaves and bushings.

We have not tried to see how *cheap* we could make a block, but how good. We have made wire rope blocks a study, and now offer the best block on the market. We challenge comparison. Try a sample pair. They will speak for themselves.

MALLEABLE IRON BLOCKS FOR WIRE ROPE (4)

Length of Shell	Diam. of Sheave	Diam. of Rope		Price	Trade No.
14 in.	10 in.	3/8 in.	Single	$9.50	55
			Double	17.50	57
			Triple	25.50	59
16 in.	12 in.	1/2 in.	Single	12.50	61
			Double	23.00	63
			Triple	31.00	65

These blocks are all fitted with our Self-Lubricating Phosphor Bronze Bushings, and while very strong, are made with special reference to lightness, for ease in handling.

BLOCKS FOR MANILA ROPE

On pages 79 and 80 will be found tables and general information relative to the blocks illustrated above

WOODEN BLOCKS—HEAVY

(1)

Heavy Inside Iron Strapped Blocks. Thick Mortise

(Harcourt's Patent)

Loose Hooks. Iron Sheaves

See illustration page 78, Fig. 1

Dimensions			Iron Bushed			Metalline Bushed Self-Lubricating		
Size of Sheave	Diameter of Rope	Size of Shell	Single	Double	Triple	Single	Double	Triple
4¼x1⅛x½	1	7	$2.25	$4.00	$5.50	$4.25	$7.50	$10.00
4¾x1⅜x⅝	1⅛	8	2.75	4.50	6.30	5.00	9.00	13.00
5½x1⅜x⅝	1⅛	9	3.15	5.25	7.25	5.75	10.50	15.00
6¼x1½x¾	1¼	10	4.00	6.50	8.50	7.25	13.50	19.00
7 x1½x¾	1¼	11	5.25	8.50	12.50	9.25	17.00	25.00
8 x1⅝x¾	1½	12	5.25	8.50	12.50	9.25	17.00	25.00
9 x1¾x¾	1½	13	8.00	13.00	17.00	13.00	23.50	33.00
9½x1⅞x⅞	1¾	14	8.00	13.00	17.00	13.00	23.50	33.00
10 x1⅞x⅞	1¾	15	9.00	15.00	20.00	15.00	26.50	37.00
11 x2⅛x1	2	16	11.50	18.00	28.00	18.00	32.00	48.00

WOODEN BLOCKS—COMMON

Inside Iron Strapped Blocks. (Harcourt's Patent)

Loose Hooks. Iron Sheaves

Dimensions			Iron Bushed			Roller Bushed		
Size of Sheave	Diameter of Rope	Size of Shell	Single	Double	Triple	Single	Double	Triple
1¾x ½x⅜	⅜	3	$0.70	$1.30	$1.75	$1.10	$2.00	$2.90
2 x ½x⅜	⅜	3½	.75	1.45	2.00	1.15	2.20	3.15
2¼x ⅝x⅜	½	4	.85	1.60	2.15	1.20	2.25	3.25
3 x ¾x⅜	⅝	5	.90	1.75	2.25	1.25	2.35	3.50
3½x1 x½	¾	6	1.10	2.00	2.90	1.50	2.85	4.40
4¼x1 x½	⅞	7	1.30	2.40	3.50	1.70	3.35	5.00
4¾x1⅛x⅝	1	8	1.65	2.85	4.25	2.25	4.15	6.00
5¾x1⅛x⅝	1	9	1.85	3.40	4.75	2.50	4.70	7.25
6¼x1¼x⅝	1⅛	10	2.75	4.50	6.25	3.50	6.00	8.50
7¼x1¼x¾	1⅛	11	4.45	7.50	10.65	5.30	9.20	13.20
8 x1⅜x¾	1¼	12	4.45	7.50	10.65	5.30	9.20	13.20
9 x1½x¾	1¼	13	7.00	10.50	15.00	8.15	12.80	18.45
9½x1⅝x⅞	1⅜	14	7.00	10.50	15.00	8.15	12.80	18.45
10 x1⅝x⅞	1½	15	8.00	13.00	18.00	9.25	15.50	21.75
11 x1¾x⅞	1⅝	16	10.00	15.00	22.00	11.50	18.00	26.50

EXTRA HEAVY TACKLE BLOCKS

(2)

(Harcourt's Patent)

Extra Heavily Strapped with Lashing Shackles For Railroad Wrecking Cars and Steamboat Use

See illustration page 78, Fig. 2

Dimensions			Common Iron Bushed			Self-Lubricating Bronze Bushed		
Size of Sheave	Diameter of Rope	Size of Shell	Single	Double	Triple	Single	Double	Triple
12x2⅜x1	2¼	18	$15.00	$29.00	$42.00	$23.00	$44.00	$63.00
14x2⅞x1¼	2½	20	21.00	37.00	54.00	32.00	54.00	77.00
15x3⅜x1¼	3	22	26.00	48.00	70.00	38.00	70.00	100.00
16x3⅞x1½	3½	24	32.00	56.00	84.00	46.00	85.00	125.00

These blocks are strapped with Norway iron and heavy lashing shackle, and are suitable to hoist from 35 to 75 tons, being the strongest and safest blocks in the world for heavy lifts.

AUTOMATIC LINK SNATCH BLOCKS

(3)

FOR MANILA ROPE

Wooden Sides

We now offer to the trade the latest and only automatic link snatch block. When the hook is unlocked you have only to press it against the link, which instantly locks it and remains so whether there is a load on it or not. It is impossible to shake the link open, making the most perfect wood snatch block ever put on the market. The iron work in these snatch blocks is as heavy, and our sheaves are as large and wide in the score, as any other make, while the workmanship is unsurpassed.

See illustration page 78, Fig. 3

Size of Sheave	Diameter of Rope	Size of Shell	Iron Bushed	Self-Lubricating Bronze Bushed
3 x1⅛x ½	¾	6	$4.00	$5.25
3½x1⅛x ½	⅞	7	4.75	6.00
4½x1⅜x ⅝	1	8	5.75	7.25
5 x1⅝x ⅝	1⅛	9	6.75	8.50
5¾x1⅞x ¾	1¼	10	8.50	11.00
6¼x2⅛x ¾	1½	12	10.00	13.00
8 x2¼x ⅞	1¾	14	13.00	16.50
9 x2⅝ x1	2	16	17.00	22.00
10 x3 x1	2¼	18	25.00	31.00
11 x3½x1¼	2½	20	38.00	46.00
11¾x4¼x1½	3	22	55.00	68.00
12½x4½x1½	3½	24	70.00	86.00

PATENT AUTOMATIC SNATCH BLOCKS

FOR MANILA ROPE

See Fig. 4, page 78

Steel Hooks Steel Straps

Steel Pins Steel Rivets

Malleable Sides

Impossible to Break the Sides

We claim for these snatch blocks superiority at every point over anything in the world.

Properly fastened they will never break.

Length of Shell Inches	Plain Bushed		Self-Lubricating Phosphor Bronze Bushed	
	Price	Trade No.	Price	Trade No.
7	$4.75	200	$5.50	201
8	5.75	202	7.00	203
10	8.50	204	10.00	205
12	10.00	206	11.50	207
14	13.00	208	15.00	209
16	17.00	210	20.00	211

STEEL TACKLE BLOCKS

FOR MANILA ROPE

See Fig 5, page 78

Steel Hooks Steel Straps

Steel Pins Steel Rivets

Impossible to Break the Sides

All these blocks are equivalent to wide mortise wooden blocks, giving plenty of room for the rope.

Our plain, roller bushed and self-lubricating sheaves are interchangeable.

Dimensions				Plain Bushed		Roller Bushed		Self-Lub. Phos. Bronze Bushed	
Length of Shell Inches	Size of Sheave Inches	Diameter of Rope		Price	Trade No.	Price	Trade No.	Price	Trade No.
4	$2\frac{1}{4} \times \frac{11}{16}$	$\frac{1}{2}$	Single	$0.90	1	....	..	$1.65	301
			Double	1.75	3	....	..	3.25	303
			Triple	2.50	5	....	..	4.75	305
5	$2\frac{3}{4} \times \frac{7}{8}$	$\frac{5}{8}$	Single	1.00	7	$1.50	8	1.80	307
			Double	1.90	9	2.90	10	3.50	309
			Triple	2.75	11	4.25	12	5.15	311
6	$3\frac{1}{4} \times 1$	$\frac{3}{4}$	Single	1.25	13	1.75	14	2.10	313
			Double	2.25	15	3.25	16	4.00	315
			Triple	3.25	17	4.75	18	5.80	317
7	$4\frac{1}{4} \times 1\frac{1}{8}$	$\frac{7}{8}$	Single	1.50	19	2.10	20	2.45	319
			Double	2.70	21	3.85	22	4.60	321
			Triple	4.00	23	5.80	24	6.85	323
8	$5 \times 1\frac{1}{4}$	1	Single	1.85	25	2.55	26	2.90	325
			Double	3.20	27	4.60	28	5.30	327
			Triple	4.75	29	6.85	30	7.90	329
9	$5\frac{1}{2} \times 1\frac{5}{16}$	$1\frac{1}{8}$	Single	2.40	31	3.20	32	3.55	331
			Double	4.00	33	5.60	34	6.30	333
			Triple	5.50	35	7.90	36	9.00	335
10	$6\frac{1}{4} \times 1\frac{3}{8}$	$1\frac{1}{4}$	Single	3.10	37	4.05	38	4.40	337
			Double	5.10	39	7.00	40	7.70	339
			Triple	7.00	41	9.85	42	11.00	341
12	$7\frac{1}{2} \times 1\frac{1}{2}$	$1\frac{3}{8}$	Single	5.00	43	6.00	44	6.45	343
			Double	8.25	45	10.35	46	11.15	345
			Triple	11.75	47	14.90	48	16.00	347
14	$8\frac{1}{2} \times 1\frac{5}{8}$	$1\frac{1}{2}$	Single	7.50	49	8.75	50	9.10	349
			Double	11.75	51	14.25	52	15.00	351
			Triple	16.50	53	20.25	54	21.30	353

TABLE OF

TRANSMISSION OF POWER BY WIRE ROPES

See article, pages 46 and 47

Diameter of Wheel in Feet	Number of Revolutions	Diameter of Rope	Horse-power	Diameter of Wheel in Feet	Number of Revolutions	Diameter of Rope	Horse-power
3	80	5/8	3	8	120	5/8	39
3	100	5/8	3 1/2	8	140	5/8	45
3	120	5/8	4	9	80	9/16—5/8	47 / 48
4	80	5/8	4	9	100	9/16—5/8	58 / 60
4	100	5/8	5	9	120	9/16—5/8	69 / 73
4	120	5/8	6	9	140	9/16—5/8	82 / 84
4	140	5/8	7	10	80	5/8—11/16	64 / 68
5	80	7/16	9	10	100	5/8—11/16	80 / 85
5	100	7/16	10	10	120	5/8—11/16	96 / 102
5	120	7/16	12	10	140	5/8—11/16	112 / 119
5	140	7/16	14	11	80	5/8	73
6	80	1/2	13	11	100	5/8	91
6	100	1/2	17	11	120	5/8	116
6	120	1/2	20	11	140	5/8	121
6	140	1/2	23	12	80	11/16—3/4	93 / 99
7	80	9/16	20	12	100	11/16—3/4	116 / 124
7	100	9/16	25	12	120	11/16—3/4	140 / 149
7	120	9/16	30	12	120	7/8	173
7	140	9/16	35	14	80	1—1 1/8	141 / 148
8	80	5/8	26	14	100	1—1 1/8	176 / 185
8	100	5/8	32	14	120	1	222

The above table shows the proper relation between the rope and wheels used in transmitting power by means of wire rope, and gives approximately the amount of power that may be thus transmitted.

LIST FOR LABOR OF

SPLICING ROPE TO MAKE ENDLESS

See pages 47, 48 and 49 on Splicing

Diameter of Rope in Inches	List for Splicing
1 1/2 to 1 1/4	$4.50
1 1/8 to 7/8	4.00
3/4 to 1/2	3.50
7/16 to 5/8	3.00
5/16 to 1/4	2.50

The charge named to be in addition to the charge made for rope used in making the splice.

The prices named to apply only on wire rope spliced at the works of the manufacturer.

FERRY BLOCK AND TRAVELER

See illustrations, page 44

	Price
Wrought-iron ferry block, with two 6-inch common sheaves	$6.00
Wrought-iron ferry block, with two 8-inch common sheaves	9.00
Wrought-iron ferry traveler, with single 10-inch common sheave	4.00
Wrought-iron ferry traveler, with single 12-inch common sheave	7.00

The lightest, strongest and most durable blocks made; can be taken apart and parts replaced with ease. Made to fit any size rope.

To make your wire rope last long, use

A. LESCHEN & SONS ROPE CO.'S WIRE ROPE PRESERVER

See article, page 7

The best made. Prevents rust and abrasion. No person using wire rope can afford to do without it. It prevents abrasion of the rope in contact with hard substances. Wire rope will last almost twice as long with the preserver as without it. The preserver prevents wire in the rope from rusting. It is the best material for coating wire rope that can be applied to it.

	Price
10-pound packages each	$1.50
25-pound packages each	3.75
50-pound packages each	6.75
100-pound packages each	12.00

Put up in barrels, special price.

Black Manila Rope

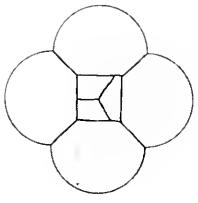
Trade marks registered

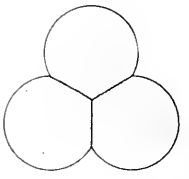
For Transmission of Power

A specially prepared rope, made from the best long fibre, strictly pure selected manila hemp, laid in plumbago, beeswax and tallow. MORE WORK CAN BE DONE WITH IT THAN WITH ANY OTHER FIBRE ROPE ON THE MARKET.

Our Black Manila is a very superior rope for transmission of power. The first cost per pound is somewhat greater, but it is the most economical rope a consumer can obtain. Ordinary rope chafes and grinds to a powder in the center, while the exterior may look as though it were but little worn.

In bending a rope over a sheave, the strands and the yarns of the strands slide a short distance upon each other, causing friction and wearing of the rope internally. Open a worn rope by untwisting the strands and a fine powder will be found, showing that when the rope was bent over the sheave the strands in sliding over each other ground some of the fibres to powder. To prevent this difficulty we lubricate the fibres with plumbago mixed with tallow and other ingredients to lubricate and waterproof same. This also lubricates the threads of the rope and prevents internal chafing.





We make Black Manila rope with four strands only. It is stronger than three-strand rope and wears rounder and smoother.

An examination of a cross section of the four-strand and the three-strand rope will show that the section of the four-strand rope is much nearer a circle, and also that the area of the strands in contact with each other to bear the strain is much greater.

To prevent an inferior rope being sold for our manufacture, we have registered the words "Black Manila" as a trade-mark by which our rope will be known. We have but one quality and it is the best.

"LESCHEN'S BEST" PURE MANILA ROPE

Made 3 and 4 strand and Hawser laid for all manila rope purposes. This brand is constructed entirely from long fibre, carefully selected manila hemp, absolutely pure, free from any mixture of sisal, istle or other fibres, and no talc nor other foreign substances to make weight is included. The price is but little above that of faulty manila and for durability and trustworthiness it is highly recommended.

OTHER CORDAGE

Sisal rope for all purposes for which it is adapted, lath yarn, tarred marlin and hemp packing of all kinds is in stock constantly.

APPROXIMATE WEIGHT AND STRENGTH OF MANILA ROPE

Manila, sisal, New Zealand and jute ropes weigh (about) alike. Tarred hemp cordage will weigh (about) one-fourth more. Manila is about 25 per cent. stronger than sisal. Working load about one-quarter of breaking strain.

Circumference in Inches	Diameter in Inches	Weight of 1,000 Feet in Pounds	Number of Feet and Inches in One Pound	Strength of New Manila Rope in Pounds	Circumference in Inches	Diameter in Inches	Weight of 1,000 Feet in Pounds	Number of Feet and Inches in One Pound	Strength of New Manila Rope in Pounds
3/4	1/4	23	50	450	4 1/4	1 3/8	597	1' 8"	14,000
1	5/16	33	33	780	4 1/2	1 7/16	669	1' 5	15,800
1 1/8	3/8	42	25	1,000	4 3/4	1 1/2	746	1' 4"	17,600
1 1/4	7/16	52	19	1,280	5	1 5/8	826	1' 2"	19,500
1 1/2	1/2	74	11	1,760	5 1/2	1 3/4	1,000	1	23,700
1 3/4	9/16	101	9	2,400	6	1 7/8	1,190	10"	28,000
2	5/8	132	7	3,140	6 1/4	2	1,291	9 1/2"	33,000
2 1/4	3/4	167	6	3,970	6 1/2	2 1/8	1,397	8 1/2"	38,000
2 1/2	13/16	207	5	4,900	7	2 1/4	1,620	7"	44,000
2 3/4	7/8	250	4	5,900	7 1/2	2 3/8	1,860	6 1/2"	50,000
3	1	297	3 6"	7,000	8	2 5/16	2,116	5 1/2"	60,000
3 1/4	1 1/16	349	2 10"	8,200	8 1/2	2 3/4	2,388	5"	63,000
3 1/2	1 1/8	405	2 4"	9,600	9	2 7/8	2,673	4 1/2"	67,700
3 3/4	1 1/4	465	2 1"	11,000	9 1/2	3	2,983	4"	70,000
4	1 5/16	529	1' 10"	12,500	10	3 3/16	3,306	3 3/8"	78,000

We Carry a Large Stock of Manila and Sisal Rope

COTTON WASTE

In Bales of 100 Pounds

No. XXX, white
No. 1, white
No. 2, white
No. 1, colored
No. 2, colored
No. 3, colored

OAKUM

In Bales of 50 Pounds

Best
United States Navy
Navy
Plumbers

Get our samples and prices before buying elsewhere.

Telegraphic Code

Ship

Code Word	
Academy	Ship by rail.
Accede	Ship by boat.
Accent	Ship by express.
Acclaim	Ship by express C. O. D.
Accord	Ship sight draft with bill of lading
Accrue	Ship to our order, sight draft with B/L of lading.
Acorn	We have shipped via.
Acre	By what route did you ship
Acrobat	We can ship at once.
Actor	We cannot ship.
Acute	We will ship to-day.
Adage	We will ship to-morrow.
Adept	We can ship part of order
Admiral	How soon can you ship :
Adore	Can you ship to-day ?
Adroit	Ship on reel containing
Adust	Can ship in days.

Order

Babe	Make and hold for shipping instructions.
Bachelor	Do not ship order
Backward	Hold for further instructions C.O.D.
Badge	We have received order.
Baffler	We have not received order
Bait	We have an order.
Bakery	We do not care to accept order
Balcony	Add to order.
Baleful	Increase our order.
Balk	Decrease our order.
Ballad	Our order is incorrect.
Balloon	Can we change your order (number or date)
Bandit	Change our order to read.
Banish	If not on hand how soon can you make :
Banking	How much have you on hand ?
Banter	Answer by wire.
Barb	Answer by night message.
Barber	Answer by mail.
Barley	Referring to your letter.
Baronet	Referring to our letter.
Barrier	Referring to your telegram.
Bashful	Referring to our telegram.
Basket	Duplicate our order (number or date)
Battery	Duplicate on our order (number or date).
Bawling	Right lay.
Bazaar	Left lay.
Beacon	Lang lay.
Beadle	Regular lay.
Beamless	Closed socket fastened to one end.
Bearded	Closed socket fastened to each end.
Bearer	Open socket fastened to one end.
Beast	Open socket fastened to each end.
Beaten	Hook and socket fastened to one end
Beaver	Swivel hook fastened on one end.
Beckon	Hook and thimble on one end.
Becoming	Oval thimble spliced in one end.
Bedding	Oval thimble spliced in each end.
Beefsteak	Hook fastened at one end and link fastened at other end.
Beehive	Hook and link fastened at one end and link fastened at other end.

Telegraph Code Continued

Code Word	Feet	Code Word	Feet	Code Word	Feet	Code Word	Feet	Code Word	Feet
Maabdeh	1	Macherode	55	Makouke	325	Meekness	3,700	Mehrbar	9,100
Maacah	2	Machiller	56	Maldigo	350	Meelbak	3,800	Mehren	9,200
Maagader	3	Machinabor	57	Maleventi	375	Meelboom	3,900	Mehrfach	9,300
Maagsap	4	Machinho	58	Mallard	400	Meelkalk	4,000	Mehrgebot	9,400
Maakloon	5	Machionis	59	Maltesas	425	Meelpap	4,100	Mehrmals	9,500
Maaksel	6	Machlosyne	60	Malzhaus	450	Meelstof	4,200	Mehrtaxe	9,600
Maakten	7	Machlyes	61	Manabilis	475	Meeltrog	4,300	Mehrzahl	9,700
Maalstrom	8	Machmas	62	Mandflesch	500	Meelvat	4,400	Meidbar	9,800
Maandag	9	Macho	63	Mangime	525	Meerbad	4,500	Meile	9,900
Maandloop	10	Machoiran	64	Maniquete	550	Meerblau	4,600	Meilenweit	10,000
Maankap	11	Machonner	65	Mannsvolk	575	Meerfisch	4,700	Meilucht	11,000
Maanoog	12	Machoquet	66	Manocage	600	Meerfloh	4,800	Meinung	12,000
Mabuse	13	Machron	67	Mantram	625	Meerfluth	4,900	Meister	13,000
Macaco	14	Machtgever	68	Marathi	650	Meerfrosch	5,000	Meiveld	14,000
Macadura	15	Machtlos	69	Marcidity	675	Meergans	5,100	Meiwind	15,000
Macaglie	16	Machtquell	70	Margelle	700	Meergott	5,200	Meiworm	16,000
Macalon	17	Machtrede	71	Markpfahl	725	Meerhafen	5,300	Meizon	17,000
Macamorda	18	Machtreich	72	Marlpriem	750	Meerkat	5,400	Mejet	18,000
Macanas	19	Machtsucht	73	Marsepein	775	Meerkohl	5,500	Mejilla	19,000
Macaque	20	Machtvoll	74	Maschine	800	Meerkrebs	5,600	Mejorado	20,000
Macarello	21	Machtwort	75	Massgeben	825	Meerlachs	5,700	Mejoro	25,000
Macarenas	22	Machucado	76	Mastiff	850	Meerluft	5,800	Melafolio	30,000
Macareux	23	Machucar	77	Matalones	875	Meerochs	5,900	Melanfillo	35,000
Macariotes	24	Machuele	78	Matroca	900	Meerpark	6,000	Melanico	40,000
Macarite	25	Machurat	79	Matulis	925	Meerplant	6,100	Melanism	45,000
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Macaw	27	Maciabit	81	Maxagua	975	Meerstrom	6,300	Melapium	55,000
Macbeth	28	Macidez	82	Mechazo	1,000	Meertau	6,400	Melarosa	60,000
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Maccoboy	30	Macilence	84	Mechones	1,200	Meertraube	6,600	Melcam	70,000
Maccum	31	Macinandos	85	Meckern	1,300	Meerval	6,700	Melde	75,000
Maceada	32	Macinasse	86	Mecodeme	1,400	Meervolk	6,800	Meldest	80,000
Maceare	33	Macinella	87	Meconato	1,500	Meerwater	6,900	Meldung	85,000
Macebat	34	Macini	88	Meconico	1,600	Meerwinde	7,000	Melenso	90,000
Macebimus	35	Macinoso	89	Medaba	1,700	Meetbar	7,100	Meleto	95,000
Macedonio	36	Macisbonne	90	Medalic	1,800	Meetbrief	7,200	Meleze	100,000
Macellava	37	Mackles	91	Medardo	1,900	Meetkan	7,300	Melgar	200,000
Macellinus	38	Maclifere	92	Meddix	2,000	Meetlood	7,400	Meliaca	300,000
Maceran	39	Macline	93	Medeborg	2,100	Meevallers	7,500	Meliflua	400,000
Maceraste	40	Maclosina	94	Medegast	2,200	Megale	7,600	Melitos	500,000
Macersi	41	Maclou	95	Medehulp	2,300	Megapode	7,700	Melkart	600,000
Macescet	42	Maclovio	96	Medela	2,400	Megarde	7,800	Melkbad	700,000
Machabeos	43	Macoco	97	Medelid	2,500	Megasse	7,900	Melkboer	800,000
Machacaz	44	Macolla	98	Medendos	2,600	Megille	8,000	Melkbrood	900,000
Machacona	45	Macomades	99	Medeole	2,700	Meglio	8,100	Melkbrug	1,000,000
Machado	46	Macoraba	100	Medica	2,800	Mehida	8,200	Melkjuk	1,100,000
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Machbenah	50	Madytus	200	Medivel	3,200	Mehldorn	8,600	Melkpot	1,500,000
Machefer	51	Mafrach	225	Medley	3,300	Mehlgips	8,700	Melksap	1,600,000
Machelier	52	Magilph	250	Medma	3,400	Mehlicht	8,800	Melksaus	1,700,000
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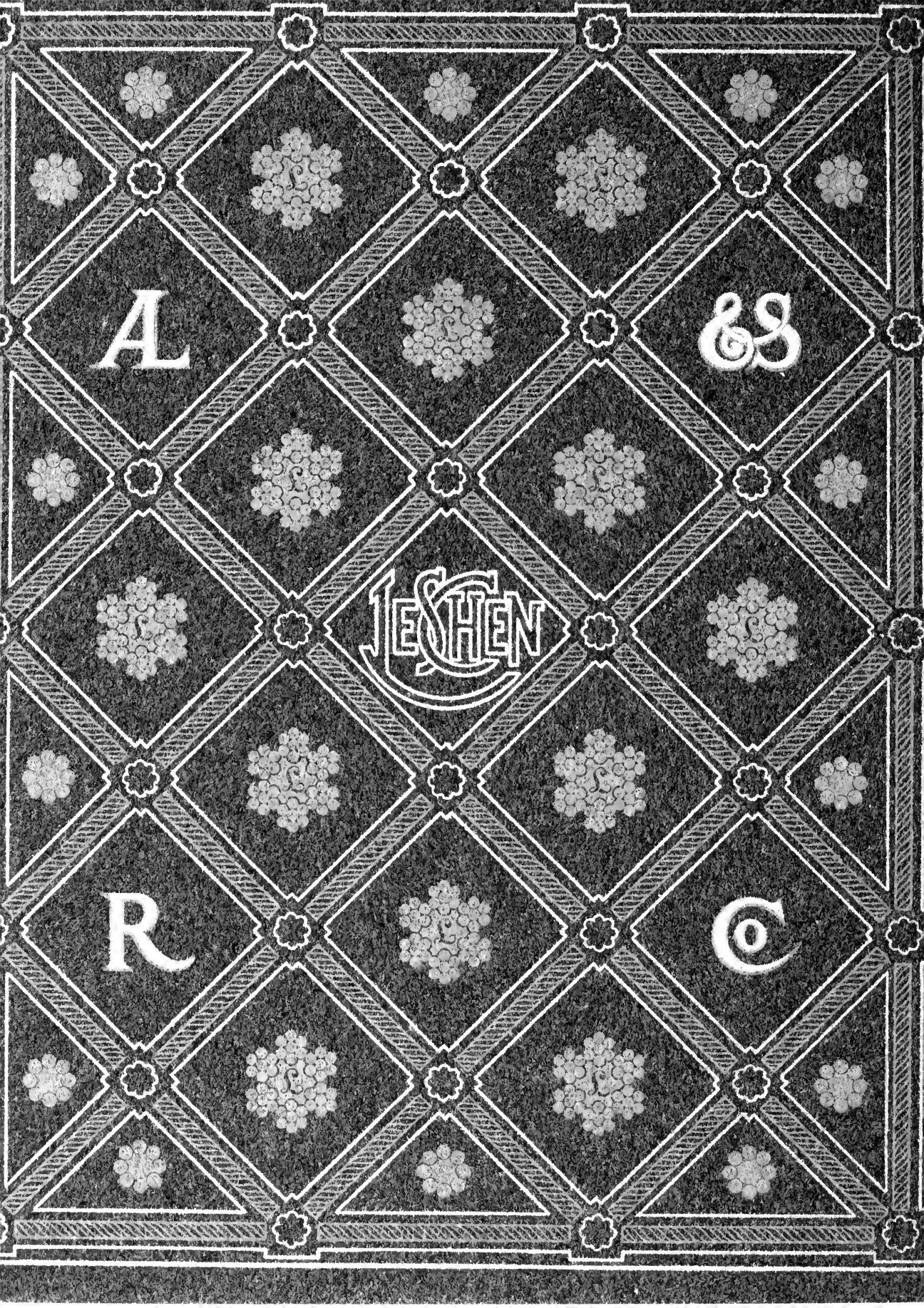
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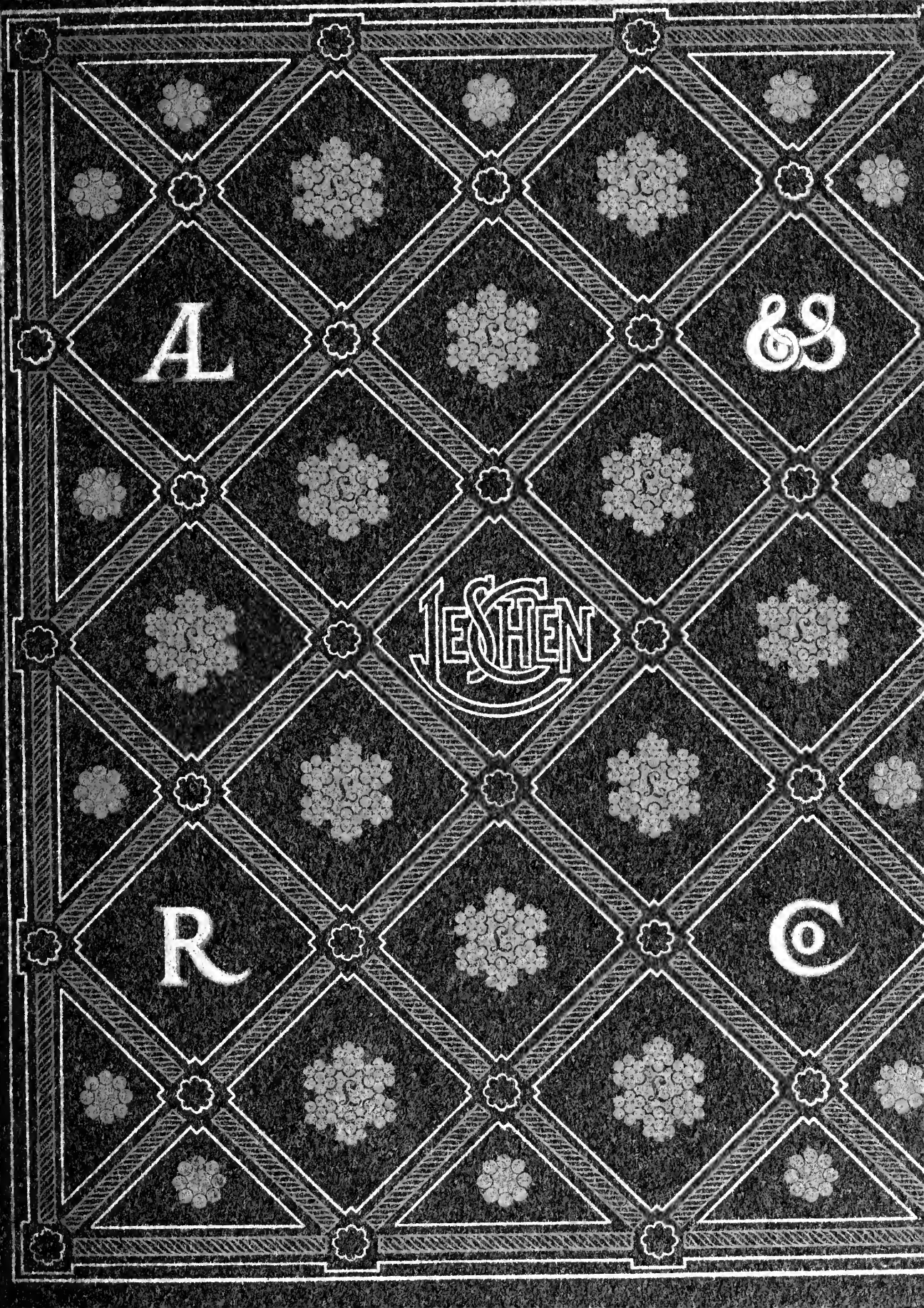
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